DOCUMENT RESUME

ED 077 772 SE 016 412

AUTHOR	Showalter, Victor
TITLE	Unified Science Education Programs and Materials. Occasional Paper Series, Science Paper 10. Science Education Information Reports.
INSTITUTION	ERIC Information Analysis Center for Science, Mathematics, and Environmental Education, Columbus, Ohio.
PUB DATE	May 73
NOTE	82p.
AVAILABLE FROM	Ohio State University, Center for Science and Mathematics Education, 244 Arps Hall, Columbus, Ohio 43210 ($1.25)
EDRS PRICE	MF-$0.65 HC-$3.29
DESCRIPTORS	Annotated Bibliographies; Curriculum; Instructional Materials; *Integrated Curriculum; *Interdisciplinary Approach; International Education; *Program Descriptions; *Science Education
IDENTIFIERS	*Unified Science

ABSTRACT

This publication provides a current listing and description of programs, student instructional materials, and related literature in the field of unified science education. In Part I, international unified science programs are presented alphabetically by country, followed by United States programs listed by state. Each program description includes a concise abstract, the grade level range over which it operates, the instructional format and availability, the program type, the year in which the information was obtained, and names and addresses of the authors. Part II consists of abstracts of student instructional materials related to unified science education, and Part III is an annotated bibliography of the related literature. In addition to abstracts of the material, these sections provide information regarding the publisher, date of publication, number of pages, reference numbers for retrieval, and the source and cost of copies of the documents. (JR)

FILMED FROM BEST AVAILABLE COPY

ED 077772

SMEAC

AN ERIC CENTER

SCIENCE, MATH, AND ENVIRONMENTAL EDUCATION INFORMATION REPORT

U.S. DEPARTMENT OF HEALTH
EDUCATION & WELFARE
NATIONAL INSTITUTE OF
EDUCATION
THIS DOCUMENT HAS BEEN REPRODUCED EXACTLY AS RECEIVED FROM THE PERSON OR ORGANIZATION ORIGINATING IT. POINTS OF VIEW OR OPINIONS STATED DO NOT NECESSARILY REPRESENT OFFICIAL NATIONAL INSTITUTE OF EDUCATION POSITION OR POLICY.

SMEAC/SCIENCE, MATHEMATICS, AND ENVIRONMENTAL EDUCATION INFORMATION ANALYSIS CENTER

. . . an information center to organize and disseminate information and materials on science, mathematics, and environmental education to teachers, administrators, supervisors, researchers, and the public. A joint project of The Ohio State University and the Educational Resources Information Center of USOE.

SE 016 412

ED 077772

SCIENCE EDUCATION INFORMATION
REPORTS

OCCASIONAL PAPER SERIES
SCIENCE PAPER 10

UNIFIED SCIENCE EDUCATION PROGRAMS AND MATERIALS

By
Victor Showalter
Center for Unified Science Education
The Ohio State University
Columbus, Ohio

THE OHIO STATE UNIVERSITY
ERIC Information Analysis Center
for Science, Mathematics, and Environmental Education
400 Lincoln Tower
Columbus, Ohio 43210

May, 1973

SCIENCE, MATHEMATICS, AND ENVIRONMENTAL EDUCATION INFORMATION REPORTS

The Science, Mathematics, and Environmental Education Information Reports are being developed to disseminate information concerning documents analyzed at the ERIC Information Analysis Center for Science, Mathematics, and Environmental Education. The reports include four types of publications. Special Bibliographies are developed to announce availability of documents in selected interest areas. These bibliographies will list most significant documents that have been published in the interest area. Guides to Resource Literature for Science, Mathematics, and Environmental Education Teachers are bibliographies that identify references for the professional growth of teachers at all levels of science, mathematics, and environmental education. Research Reviews are issued to analyze and synthesize research related to science, mathematics, and environmental education over a period of several years. The Occasional Paper Series is designed to present research reviews and discussions related to specific educational topics.

The Science, Mathematics, and Environmental Education Information Reports will be announced in the SMEAC Newsletters as they become available.

Occasional Paper Series - Science

The Occasional Paper Series (Science) is designed to review literature related to specific topics or educational programs related to the teaching and learning of science. We hope these papers will provide ideas for implementing research, suggestions for areas that are in need of research, and suggestions for research design.

Stanley L. Helgeson
and
Patricia E. Blosser
Editors

Sponsored by the Educational Resources Information Center of the United States Office of Education and The Ohio State University.

This publication was prepared pursuant to a contract with the Office of Education, United States Department of Health, Education, and Welfare. Contractors undertaking such projects under Government sponsorship are encouraged to express freely their judgment in professional and technical matters. Points of view or opinions do not, therefore, necessarily represent official Office of Education position or policy.

TABLE OF CONTENTS

PART I: ABSTRACTS OF UNIFIED SCIENCE PROGRAMS 1

International 3

Africa 3

Australia 3

Canada 5

England 6

France 7

India 8

Israel 8

Japan 8

Malaysia 9

New Guinea 9

Nigeria 9

Scotland 10

West Germany 11

United States 12

California 12

Colorado 14

Connecticut 15

District of Columbia 16

Florida 17

Georgia 18

Hawaii 18

Illinois 19

Indiana 20

Maine 20

Maryland 20

Massachusetts 21

Michigan 22

Minnesota 25

Missouri 26

Nebraska 26

New Jersey 27

New York 28

North Dakota 30

Ohio 31

Oregon 33

Pennsylvania 34

Texas 35

Wisconsin 36

PART II: ABSTRACTS OF STUDENT INSTRUCTIONAL MATERIALS RELATED TO UNIFIED SCIENCE EDUCATION 37

PART III: ANNOTATED BIBLIOGRAPHY RELATED TO UNIFIED SCIENCE EDUCATION 62

PART I: ABSTRACTS OF UNIFIED SCIENCE PROGRAMS

ABSTRACTS OF UNIFIED SCIENCE PROGRAMS

Explanation of coded information on entries in this document

9-12 A-2 I	Program Name	Contact Person Address
	(Program Abstract)	
1972		DOE, JONES

9-12 = grade level range over which program operates

A-2 = Instructional format and availability

- A = individualized, self-paced (LAPS, UNIPACS, etc.)
- B = conventional text-lab
- C = multi-source syllabus (instructional materials selected from multiple commercial sources)
- D = optional sequence (teachers and/or students make decisions on which activities to do but a coherent class group is maintained)
- 1 = commercially available
- 2 = available through non-commercial source, usually the program director
- NO = materials not yet available

I = Program type

- I = unified science (science viewed as a whole, organized around big ideas that permeate all science, subject matter selected from a broad range of specialized sciences)
- II = integrated science (program results from putting together two or more previously separate school subjects,i.e. chemistry and physics)
- III = interdisciplinary science (several specialized sciences brought to bear temporarily on a specific problem with a tendency to keep the sciences separate -or- a single science as it is applied to other science related areas as in the case of organic chemistry applied to paint, food, and life processes)
- IV = general science (a series of mini-courses or short courses in specialized sciences)
- V = coordinated science (two or more specialized science courses taught in parallel to each other)
- VI = teacher preparation (designed to prepare teachers of unified science programs and may consist of any one or combination of types I - V)

1972 = year in which information was obtained as basis for abstract of program

DOE, JONES = authors of articles which are related to this program

INTERNATIONAL

Programs Are Listed Alphabetically By Country

6-8 B-2 I

Course Curriculum
Integrated Science
Institute of Education
University of Sierra Leone

D. R. Hill
Curriculum Revision Unit
c/o P.O. Box 124
Freetown, Sierra Leone
AFRICA

The objective of this course is to provide an introductory course in science at the secondary level suitable for all entrants regardless of their ultimate field of specialization. The course provides a broad, integrated view of science. The program stresses pupil activity. Begun in 1971, the program is geared toward the gifted student and participants are chosen from the top quartile of their year group. There are 13 teachers involved.

1972

7-8 A-1 II

Junior Secondary Science Project
Australian Council for Educational Research

W. C. Radford
Frederick Street
Hawthorn
AUSTRALIA 3122

The objective of Junior Secondary Science Project is to prepare science learning materials for the first four years of Victorian secondary schools. At the present time, materials are completed for grades 7-8. The learning materials consist of card systems with optional remedial branches and accompanying teachers' guides and are designed to enable individual rate of student progress. Much independent study is going on. Laboratory investigation is an integral part of each learning system. An inquiry approach is utilized. The program began in 1966. There are two series: Red and Green. There are 200 schools involved; 600 teachers; 20,000 students.

1970

6-12	B-2 IV	General Science	234 Queensbury S.
Form 1,2,3,4,5		Curriculum and Research Branch	Melbourne 3001 AUSTRALIA

The aims of the course are threefold: (1) to present science as an inherent part of man's culture, (2) to present all students with a wide range of scientific knowledge which will assist them in living in their environment, and (3) to show that the disciplines of science can be applied to everyday problems. The first part of the course is spent on the pure sciences and the second, on applied sciences. The program began in 1960 and is present in all technical schools.

1972

11-12	B-2 I	National Science Curriculum Materials Project	R. T. Slattery, Director 2/32 Church Street Ryde, 2112, N.S.W. AUSTRALIA

The National Science Curriculum Materials Project seeks to show the creative processes of science. The materials make clear the qualities of science: the value of evidence in reaching conclusions; the development of knowledge through a series of stages; open-mindedness; and many others. Science is associated with personal, community, national and international problems rather than teaching science for its own sake. The materials stimulate imagination and inventiveness. Physical Science Study Committee, Chemical Education Materials Study, Biological Sciences Curriculum Study, Earth Science Curriculum Project, Harvard Project Physics, and the Nuffield Projects were all used as resources as the project developed, as the subjects included in National Science Curriculum Materials Project are physics, chemistry, biology and geology. The program began in 1968 and is taught in modular units.

1970

6-9	B-2 I	The Science Foundation for Physics Science Textbook Project for the New South Wales Six Year Science Courses University of Sydney	Harry Messel School Physics Science Foundation for Physics Sydney, N.S.W. AUSTRALIA

The purpose of the project is to provide texts and materials for the six-year integrated and coordinated science courses in New South Wales. (This was the first program to treat the six years of secondary science in an integrated fashion.) The two highest grade levels are separated according to ability. Initiated in 1962, the program reaches 30-40,000 students in 350 schools; 1,500 teachers are using the materials developed by the program.

1970

9-10 A-1 I Australian Science Education Project

H. O. Howard
11 Glenbervie Road
Toorak, Victoria 3142
AUSTRALIA

The project was initiated to develop instructional materials in science for both teachers and students of grades 7-10. These materials are geared toward developing within the student an understanding of man in his environment, skills, and attitudes important in scientific investigation, an understanding of the nature, scope and limitations of science and technology. It is believed that the above values and skills will contribute to intellectual, social, and emotional development. This is thought to be the main aim of science in the secondary school and it is most effective when tailored to the individual needs of the students. The units are tailored to the Piagetian stages of development: Australian Science Education Project 1 - Concrete; Australian Science Education Project 2 - Transitional; Australian Science Education Project 3 - Formal.

1972

2-6 A-C IV Thematic Elementary Science, Individualized Studies
St. Cecili's School

Harry Zuurbier
610 Agacte Cr., S.E.
Calgary, Alberta
CANADA

Thematic Elementary Science, Individualized Studies (THESIS) is a student-determined program. Because the student makes the decisions, it is individualized. Thematic Elementary Science, Individualized Studies is conducting an ongoing search for learning material that is student rather than teacher-oriented. Thematic Elementary Science, Individualized Studies began in 1969 and is involved with over 500 students in grades 2-6.

1972

ZUURBIER, VAN TIGHEM

B-14 B-C 1 I Interdisciplinary Science Program
York University
Petrie Science Building

S. V. Filseth, Director
4700 Keele Street
Downsview, Ontario
CANADA

The program presents principles of physics, chemistry, biology and mathematics in a unified manner, emphasizing the interrelationships within these areas. It is believed that this multi-disciplinary approach will better prepare students to respond to questions in the specialized disciplines--both pure and applied. This course has 100 sections, 1,500 students. There are 20 lecturers, and 100 tutorial leaders (all with Ph.D.'s).

1972

13 A-2 VI Inter-University Biology Teaching Project
Bath University

W. H. Dowdeswell
School of Education
Bath, ENGLAND

The Inter-University Biology Teaching Project is being conducted at six universities: Glasgow, Birmingham, London (Queen Elizabeth and Chelsea Colleges), Bath, and Sussex. The project seeks to combine biological expertise with educational technology. Each university works on a different facet of the project, developing various short, modular courses. Some of the modules are "Electricity for Biologists," "Life Cycles and Genetic Analysis," "Animal Behavior," etc. The purpose of the project is to interject new teaching methods into science. Instructional materials will be published by Longmans in the future.

1972 DOWDESWELL

5-7 B-1 II Nuffield Combined Science Project
City of Birmingham College of Education

M. J. Elwell
Westbourne Road
Birmingham B153TN
ENGLAND

Combined Science serves as a bridge between science work in the primary and secondary grades. It orients pupils to the concept of science and to the world around them. The unity of science is stressed throughout. The course is geared to ages 11-13, with one teacher per class. The instructional format is divided into sections and subsections, with various investigations for each subsection. There is no formal testing program as it is believed this would interfere with the free atmosphere of the course.

1972

1-7 B-1 VI Science
University of Bristol
School of Education

Leonard F. Ennever
9 Tyndall Avenue
Bristol BS8 1TQ
ENGLAND

This program is based on the discovery method of learning. Instructional units have been developed for teachers illustrating how the project objectives (listed in the publication "With Objectives in Mind") might be achieved. The units do not constitute a course; rather, they are materials from which a course might be constructed. It is believed that each teacher should construct his own course, structured to the needs of his students. The program began in 1967 and is being used in 72 schools in England and Wales (3,000 pupils).

1970

12 B-2 I Project Simulate
Chelsea College
Center for Science Education

Peter G. Dean
Bridges Place
London SW 6 4 HR
ENGLAND

Project SIMULATE is working on integrating the use of computers into the secondary science curriculum. Computers are being used in simulated experiments at the present time. It is felt that as computers are useful not only to the mathematician, their use should be studied by all secondary students. The project began in 1971 and is going on in ten schools. Materials will be made available commercially in the future.

1972 DEAN, HYSLOP, LEWIS

10-12 B-2 I Schools Council Integrated Science Project
Schools Council Information Section
160 Great Portland Street
London, W1 N 6LL, ENGLAND

This program views science as a series of unending patterns; each facet of science can be viewed as a pattern. The student should be concerned with the scientific processes and should be proficient in both individual and group investigation. Social implications of the sciences are studied as an integral part of science. The project began in 1969, employs 50 teachers, and covers 50 classes and 1,300 students.

1972 HALL

---

14 B-1 II Programme in Integrated Science Teaching
UNESCO

Shelia M. Haggis
Division of Science Teaching
Place de Fontenoy
75 - Paris 7, FRANCE

This program conducts pilot experiments to develop new methods and materials for national integrated science teaching at the primary and lower secondary levels, and for the training of science teachers. The materials developed by each group should be specifically suited to the needs of each individual program. The program began in 1969 and serves all UNESCO Member States.

1972

1-15 B-1 I Community Science Center (CSC) K. B. Shah, Director
Navrangpura
Ahmedabad-9, INDIA

The program combines the physical and biological sciences and mathematics. It is hoped that students will gain insight into science by the process of inquiry and problem-solving technique. The program stimulates interest in science and the scientific method at all levels; it draws relationships between science and the community; and clarifies the social implications of science and technology. Community Science Center began in 1963. Its materials do not constitute a course curriculum but rather outline a method of improving science education.

1970

7-9 C-2 III Agriculture As Environmental Science Curriculum Center Ministry of Education and Culture — Abraham Blum, Director
4 Mamilla Street
Jerusalem
ISRAEL

In this program agriculture is viewed as applied biology; the endeavor of man to manipulate his environment. Agriculture is viewed as a "real life" problem and the students learn how to come to grips with it. The social sciences become involved as well as the biological, as agriculture is taught not so much as a distinct science but as a part of life. The integration of biological and social aspects is essential to the ability of decision-making in the area. In summary, science is viewed as part of man's intellectual and cultural complex. The program started in 1967 and today involves 110 teachers, 11,000 students, and an advisory committee involving scientists, educational specialists and a writing team.

1972

7-9 B-2 II Integrated Science Curriculum Project Tokyo Institute for Education — K. Kurita
1-1-14 Meguro
Meguro-ku, Tokyo
JAPAN

The purpose of the project is to develop an integrated science curriculum for the junior high school. It is believed that natural science can be learned more completely and efficiently in this manner. The program began in April, 1971. It will be expanded to the elementary grades in the future. The project serves 500 junior high students at the present time.

1972

7-9 C-2 II Integrated Science

Mr. Chang Kwai
Ministry of Education
Educational Development
Center
Damansara, Kuala Lumpur
MALAYSIA

Development began in 1969 of an integrated science program for ages 12-15 of all ability levels. Plan for eventual adoption in all Malaysia for about 750 schools and 500,000 pupils by 1976. Initial materials have been borrowed from the Scottish Integrated Science Scheme and adapted locally. Reorientation of teachers and development of materials, proto-type apparatus, etc., are major areas of concern at this time. Financially supported by Malaysia Ministry with some aid from Britain.

1973

7-11 B-2 Pilot Secondary Science Syllabus
Educational Office

D. A. Mitchell
P.O. Box 2070
Jomba
Madang, NEW GUINEA

The purpose of this program is to develop a syllabus for the first four years of high school science in Papua. At the moment, both Pupils' Readers and Teachers' Guides are available. The program is staffed by 16 teachers and a syllabus committee of 8. There are approximately 20 classes with 800 students.

1972

7-8 B-2 II Nigerian Integrated Science Project
University of Ibadan
International School

The General Secretary
Science Teachers'
Association of Nigeria
Ibadan, NIGERIA

This program develops instructional materials for integrated science teaching in the Nigerian Secondary Schools. The program is staffed by officials of STAN. Activities include laboratory, discussion, and outdoor. The program began in 1969.

1972

6-10	B-1	II	Scottish Integrated Science Syllabus Scottish Education Department	A. W. Jeffrey, HMI St. Andrew's House Edinburgh SCOTLAND

Scottish Integrated Science is a two-year integrated science program which serves as the student's general introduction to science. The course gives students a chance to use information rather than memorize it. The project is geared to students of all abilities in the 6-8 grades, and to low-ability students in grades 8-10. This program began in 1964.

1972

13	A-2	VI	Inter-University Biology Teaching Project University of Glasgow Departments of Education and Zoology	Gaye Manwaring Glasgow, W. 2 SCOTLAND

The Inter-University Biology Teaching Project is being conducted at six colleges in the United Kingdom; the University of Glasgow is one of them. The project seeks to combine biological expertise with educational technology. Each University works on a different facet of the project. Glasgow is developing two short modular courses: "Developmental Biology" and "Animal Behavior." Each course will consist of three hours introduction followed by twelve hours of main instruction. The purpose of the project is to interject new teaching methods into science. "Developmental Biology" began in October, 1969; "Animal Behavior" is still in the developmental stages. Instructional materials will be published by Longmans in the future. Three hundred students are taking part in this course.

1972

6-8	A-B 2	II	Project PHI University of Glasgow	Martyn Roebuck 4 University Gardens Glasgow G 12 8 QQ SCOTLAND

This project is working on the development of multimedia approaches to the teaching of integrated science. It is believed that programmed learning needs to be teacher-oriented as well as learner-oriented. The program began in 1971.

1972

1-4 B-1 II Science Teaching in the Elementary School (NUG)
Pedagogische Hochschule
Lehrstuhl fuer Didaktik der Physik

K. Spreckelsen
Konstantin-uhde-Strasse 16
33 Braunschweig
WEST GERMANY

The NUG project has constructed a curriculum including both a conceptual and a process framework. In the conceptual or content area of the 1st grade unit, the student learns the properties of solids, liquids and gases; in the process area, the student is concerned with observation, classification and comparison (measuring, etc.). The project intends to devise detailed teachers' guides so that the program can be implemented in all elementary schools. Physics and chemistry are particularly stressed in the program. NUG began in 1969 and is suited to all ability levels.

1970

UNITED STATES

Programs Are Listed Alphabetically By States

9-12 B-2 II Ideas and Investigations Project (IIS)
An Approach to Science for the Educationally Uninvolved

Harry K. Wong
Menlo-Atherton High School
Atherton, California 94025

This course was designed for the slow learner and the low achiever. It stresses continued success and its syllabus consists of a series of sequentially integrated laboratory investigations designed to capture the students' interest. The pilot program began in 1965, has been adopted by 21 schools and 27 teachers, and reaches 900 students. Materials are published by Prentice-Hall, Incorporated.

1970

1-6 B-1 I Science Curriculum Improvement Study
University of California

Robert Karplus, Director
Lawrence Hall of Science
Berkeley, California 94720

Science Curriculum Improvement Study has designed conceptually oriented, sequential physical and life science programs for the elementary school. Its goal is to develop scientific literacy. Children learn in an atmosphere of intellectual freedom. They learn to accept and reject ideas on the basis of their own observations. Each unit is designed to promote understanding of scientific concepts and process-oriented concepts. It is estimated that 800,000 students use kits produced by Science Curriculum Improvement Study. The program began in 1962. Materials are published by D. C. Heath.

1972 BERGER, CONARD, FISHLEDER, KARPLUS, LAWSON, ROWE, THIER

10-11	C-2	II	Beverly Hills High School Introductory Physics/ Chemistry	Frank D. Crean Science Chairman 241 Moreno Drive Beverly Hills, California 90212

An integrated chemistry-physics course designed for high ability students preparing for advanced placement biology, chemistry, and physics. Three science teachers utilize staff developed and commercially available materials to teach the 85 students enrolled in the program.

1973

13	C 1-2	II	Course in Biophysics California State Polytechnic College	Douglas C. Giancoli Pomona, California 91768

This course is geared toward college seniors. It is a culmination of the college years and ties together physics, chemistry and biology (mostly at the molecular level) for the student. The course is taught by two experienced professors as an elective for science majors. There is one section of approximately 25 students. The program was begun in 1969 and is intended for future elementary and secondary science teachers.

1972

13	B-C	II	Physical Science Program California State Polytechnic College	Douglas C. Giancoli Pomona, California 91768

The purpose is to give students an overall view of the physical sciences through an integrated approach. It was especially designed for elementary school teachers. The program will begin in the 1973 school year. It will be team-taught by three or more professors. It is estimated that there will be 25-30 students in each of two sections.

1972

9	B-2	I	Science I Cupertino High School, Fremont Union High School District	Betty Jo Montag P.O. Box F Sunnyvale, California 94087

A required ninth grade program that integrates the disciplines of chemistry, biology, and physics, designed to give background necessary for further science courses or to serve as a terminal science program providing a high degree of scientific literacy. Team-taught to over 500 students. A three volume, internally-written text has been produced. All concepts are related to energy relationships.

1972

10-12 A-2 I Buena High School
"Unified Science"

Mr. Terry R. Holts
Science Chairman
5620 Telegraph Road
Ventura, California
93003

Program is now in the planning stages for the 1974-75 school year. Anticipate starting the program with 90 students and three teachers. They hope to develop LAPS to be used in conjunction with other materials.

1973

5-8 C-2 I B.S.C.S. Human Sciences (Biological Science Curriculum Study), University of Colorado, Boulder

Fred A. Rasmussen
Boulder, Colorado
80302

An NSF project now writing experimental materials supporting seven general objectives related to interactions that occur among communities of living things and the processes used to investigate such interactions. Levels of Piagetian tasks are being given careful attention in developing appropriate materials. The materials are being developed in modular units with varied formats utilizing internally produced materials. Limited trial materials will be available from BSCS in the fall of 1973.

1973

K-13 D-2 I Earth Science Educational Programs
Environmental Studies and Science Teacher Preparation

William D. Romey
Box 1559
Boulder, Colorado
80302

This program provides educational freedom for the student. He is permitted to set his own educational course without extrinsic pressures. The course treats not only the physical and life sciences, but also the social sciences, English, art, and music. The program began in 1969 and is geared to students of all abilities. There are six staff members.

1972

LEPPER

4-5 11-12	C-2	III	SADMESS (Student Assisted Development of Materials for Environmental & Social Studies) Social Science Education Consortium	Karen B. Wiley Staff Associate 855 Broadway Boulder, Colorado 80302

Concentrating on the area of content concerning the social aspects of environmental science, this program is developing materials for fourth and fifth graders and eleventh and twelfth graders. A unique aspect of the program is the involvement of six high school students at all stages of the activity development process. Students will develop, test, and teach their own materials and models. Members of the staff also include persons with backgrounds in economics, science, and social studies.

1973

10-11 11-12	C-1	II	Chemistry H-Physics H E. W. Smith High School	Mahlon F. Hayden Storrs, Connecticut 06268

The purpose of the program is to emphasize the common elements of physics and chemistry. It is believed that the technique makes for more efficient learning of chemistry since the requisite physical concepts are presented prior to or concurrent with the chemical information. Application of principles of physics outside a purely physics context are also dealt with. This integration will make the learning of both physics and chemistry more efficient. The program began in 1965 and is suitable for students in the 10th and 11th grades or 11th-12th grades. There are presently two classes with a total of 45 students. One teacher, qualified in both chemistry and physics, staffs the program.

1972 HAYDEN

10-11	B-2	I	Westport Unified Science Program Staples High School	Stanley W. Rhodes Science Resourceman and Assistant Headmaster 70 North Avenue Westport, Connecticut 06880

A two-year unified program designed for the 10th and 11th grade "non-science motivated" student of average ability. The internally written and produced materials are investigation oriented.

1973

K-15 B-2 I Total Education in the Total Environment (TETE)

William R. Eblen
954 Ridgefield Road
Wilton, Connecticut
06897

The purpose of the program is to make clear the interdependence of science with the environment, and to make people aware of their responsibility to the environment. The program is an approach to science, not a course. To achieve its objectives, the program stresses unifying concepts. Begun in 1964, the program has been implemented in 15 schools and reaches 5000 students.

1970

H B-1 VI Natural Science
The American University
Department of Chemistry

Doris E. Hadary
Massachusetts and
Nebraska Avenue
Washington, D.C.
20016

This is a teacher preparation course in unified science for elementary education teachers. It is specifically geared to problems of special education. It combines materials from Science Course Improvement Study, Elementary School Science, Conceptually Oriented Program for Elementary Science, and Science - A Process Approach. The course runs for two semesters and the student teachers have chances for experience in a demonstration school. The program is activity-oriented. There are 120 "students" in the program which employs one professor and eight undergraduate assistants. The program began in 1971.

1972 HADARY, SCHUBERT

1-6 -3 I Science - A Process Approach
Reed College
American Association for the Advancement of Science

Arthur Livermore
1515 Massachusetts Avenue,
North West
Washington, D.C.
20015

The first task of science education is seen as awakening the interest of the student in science (whether or not he is interested in science as a career). The best approach to science is to view it as a procedure of inquiry. In this approach the scientific processes are indispensable. It is believed that science cannot be divided into categories--the scientific principles which bridge the disciplines must be studied. Activities are emphasized above lecture. The activities are geared toward fulfilling behavioral objectives--the 14 processes of science.

1972 KESSEN, KURTZ, LIVERMORE, MAYOR, SEARS

10-12 A-C I P. K. Yonge Correlated Science Program
University of Florida

Dr. Donald Altieri
Director
P. K. Yonge Laboratory School
Gainesville, Florida
32501

Nature and science are interdisciplinary. The main purpose of secondary schooling is general education. Major integrating science concepts have more lasting value than do "facts." The study of the relationships between science and society is essential. The students must be treated as individuals with individual learning styles. The three major components of the program are (1) the major integrating concepts of science, (2) the processes and skills of scientific investigations, and (3) the interrelationships of science and society. Begun in September, 1968, there are three teachers involved and 40 students.

1972 ALTIERI, GADSDEN, ALLEN

K-12 III,VI Nova Environmental Education Project
Nova High School

John Arena
3600 S. W. College
Ft. Lauderdale, Florida
33314

Though not considered consonant with the Center definition for "unified science," information is abstracted here for possible use by unified science course developers. This ESEA, Title III project is developing a K-12 continuum in environmental education. Materials (mostly locally created) will be designed to enhance the learning of concepts and principles contained in the continuum. Inservice training will be provided for about 70 teachers. Write to project for further information.

1973

1-6 A-2 I Child-Structured Learning in Science
Florida State University

Charles C. Matthews
Director
Department of Science Education
Tallahassee, Florida
32306

This program is founded on the "discovery" approach. "Learning how to learn" is of major importance. Learning takes place in both the cognitive and affective domains. The curriculum is designed for students in the preoperational and concrete operational stages of development. The teacher guides the child as he learns on his own; she lets him find his own information, she does not supply it for him. The teacher should always accept the student's work, never praise or blame it.

1972 MATTHEWS, WESTMEYER

7-9 A-1 I Intermediate Science Curriculum Study (ISCS)
Florida State University

Adrian Lovell
415 Monroe Street
Tallahassee, Florida
32301

Intermediate Science Curriculum Study is concerned with the preparation of individualized, self-pacing laboratory centered instruction and evaluation materials. Intermediate Science Curriculum Study believes that science at the intermediate level should be activity-centered. This will capture students' interest for study in the high school and college years. The courses should serve a general education function; they should be integrative and adaptable to the students' individual needs. Intermediate Science Curriculum Study began in 1962 and now covers 1300 schools and over 500,000 students. There is a staff of five faculty, two editors, four artists, and five administrative personnel. Writing conferences are held annually in the summer. Materials are published by Silver-Burdett.

1972 INTERMEDIATE SCIENCE CURRICULUM STUDY

---

1 B-1 II Cooperative General Science Program
Clark College

O. P. Puri
240 Chestnut Street, S.W.
Atlanta, Georgia
30314

This program integrates the physical and biological sciences and is intended for non-science majors. The curriculum also develops a relationship between science and society. It is hoped that this agenda will build an appreciation of science within the student. This program began in 1966. There are ten members on the staff and 1,000 students enrolled in courses each semester.

1972 PURI

7-9 B-3 I Foundational Approaches in Science Teaching (FAST)
University Laboratory School

Frances M. Pottenger
Science Department
Honolulu, Hawaii
96822

Foundational Approaches in Science Teaching is a three-year sequential laboratory and field-centered science program. It develops an understanding of foundational concepts and methodologies of the physical, earth, and biological sciences; it relates these concepts to man's manipulation and use of his environment. The relevance of the program to everyday life makes it valuable to both science and non-science majors. The program capitalizes on the developmental tasks learned during adolescence and is thereby useful for the cognitive development of the student. The program began in 1967. Over 10,000 students are utilizing the program throughout the state.

1972

K-5 B-1 I Lincolnwood Science Program
Lincolnwood Schools

Theodore J. Bargman
6950 East Prairie
Lincolnwood, Illinois
60645

This program presents a curriculum which will serve the student throughout his life, not only while he is in school. It emphasizes values, skills, attitudes, concepts, understanding and inquiry as opposed to facts. The program is designed to help the student achieve scientific literacy. The big ideas which permeate the disciplines are presented. Once understood, these ideas have more "staging power" than isolated facts. The program, beginning Fall of 1972, will use Conceptually Oriented Program for Elementary Science materials. Its 40 classes and 1,000 students will occasionally be team-taught.

1972 BARNARD, CONCEPTUALLY ORIENTED PROGRAM FOR ELEMENTARY SCIENCE MATERIALS

10-12 A-2 I Natural Science (T.H.I.S.)
Moline Senior High School

F. Darrell Goar
Moline, Illinois
61265

T.H.I.S. is a three-year, self-paced, unified science program. It utilizes team teaching and humanities enrichment. It is not believed that the job of a high school science course is to prepare the student for a career in science--that will be done in college. Conversely, the high school program should introduce the student to (1) the wonders of his environment, (2) the processes of adaptation to the environment, (3) the processes of gaining knowledge and understanding nature, and (4) the processes of change. These concepts will give the student a better understanding of the specific fields of science by showing him the interrelationships between the fields. The program began in 1970. Special, short modular units have been produced specifically for the purpose. The modules may be elected and are completed individually and at the student's own pace.

1972

10-11 B-2 II Physical Science
11-12 Moline Senior High School

F. Darrell Goar
Moline, Illinois
61265

It is believed that the integration of chemistry and physics in a sequential two-year course would capitalize on the strengths of each course and make a definite contribution to secondary school science. The accepted form of one year of study in chemistry preceding one year of study in physics is not as strong, for the physical concepts necessary to fully understand chemistry would not be in the student's background. This program began in 1960. There are 248 students in five classes.

1972

14	VI	Purdue University Elementary Science and Social Studies Methods Course	Dr. Alfred De Vito Director Elementary Education Lafayette, Indiana 47907

As part of their teacher training, students may develop a "combined Social Studies and Science Interest Center." Students are encouraged to develop lessons through "discrepant" events that will relate procedures to processes common to both social studies and science. They then present these lessons to the science methods class and the social studies class.

1973

K-12	II	Oxford Hills High School	Robert D. Littlefield South Paris, Maine 04281

We have little information on the program other than that it is striving toward integration at the secondary level. The program began at the kindergarten and first grade level in 1968.

1972

K-12	A-2	I	Unified Science Approach, K-12 Anne Arundel County Public Schools	Neal V. Fertitta 27 Chinquapin Round Road Annapolis, Maryland 21401

The purpose of the program is to implement unified science (in grades K-12), in the schools of Anne Arundel County, Maryland. To do this, curriculum development was initiated as an ongoing process, and a staff of resource teachers was assembled. In addition, the program provides inservice training for science teachers, K-12. Science is studied through major concepts which interrelate all of the disciplines. The processes of inquiry and problem solving are united in the program. Begun in September, 1970, this program is individual and self-paced. It spans 100 schools and involves 75,000 students.

1972

9-12 A-2 I Development of a Unified Science Program for an Open Space High School
Wilde Lake High School

Maria B. Penny
Trompet Road
Columbia, Maryland
21044

The purpose of the program is the development of learning activity packets (LAPS). The packets are individualized. The program supports the concept of unified science: it is more valuable to study science as thematic units which are common to all the sciences. At the present time there are 800 students, 9-12 grades, using these materials. The project employs four teachers, and four aides. It began in September, 1971.

1972

10-11 C-2 I Unified Science Program
Deerfield Academy

Chesley W. Corkum, Jr.
Box 44
Deerfield, Massachusetts
01342

A unified program being piloted in the 10th grade for possible expansion to a two-year core program for sophomores and "optional" program for juniors. The pilot course has been organized in phases: Phase 1 involves "Conceptual Material," Phase 2,"Principles of Problem Solving," Phase 3,"Principles of Problem Solving with Application of Concepts," and Phase 4,a return to "Conceptual Material." Additional phases might include student "contract construction" in interest area.

1973

1-9 B-2 I Unified Science and Mathematics for Elementary Schools
Education Development Center

Earle L. Loman, Director
55 Chapel Street
Newton, Massachusetts
02160

This program integrates science, mathematics, and the social sciences. Science activities are stressed above reading and lecture. The curriculum is open-ended--the accomplishments of the students determine the next phase of their activity. The distinguishing factor of this program is its emphasis on long range real problems for motivation, and a focus of activities allowing a discovery approach. The program began in January, 1970, and now spans 12-15 schools, 50 classrooms, and 1,500 children.

1972

K-8 B-1 I Elementary Science Study

Christopher Hale, Director
55 Chapel Street
Newton, Massachusetts
02160

This program combines the traditional learning situation with the imaginative. Children acquire useful information, not by notes, but by active participation. Questions are encouraged so that their understanding will be deepened. The objective is for children to feel at home with science--not intimidated by it. Units begin with ideas; facilities are then devised for its study. More active experimentation is done than passive reading and lecturing. The program began in 1960 and today reaches as many as four million students. Twenty to thirty teachers, scientists, philosophers, and psychologists are at continual work, improving the program.

1972

ELEMENTARY SCIENCE STUDY

9-11 A-B 2 I Unified Science Program
Lincoln Sudbury Regional
High School

Ouida L. Bailey, Director
Sudbury, Massachusetts
01778

The unity of science is explored through individualized approaches to provide an awareness of the relation between science and society. It is important that the student understands man's relationship to his environment and his responsibility for the preservation of life. Emphasis is placed on the cognitive skills necessary to deal with the problem of an increasingly complex society and to assist him in acquiring analytical tools to handle this information. Although instructional materials are written by participating teachers, reference texts listed include Biological Sciences Curriculum Study, Physical Science Study Committee, Chemical Bond Approach, etc. The students have access to the Natick and Massachusetts Institute of Technology laboratories. Begun in 1967, there are 127 students involved in the program, teamtaught by four teachers.

1972

BAILEY

11-12 B-1 VI Sociological Resources for the Social Studies

Robert C. Angell
503 First National Building
Ann Arbor, Michigan
48108

The objective of Sociological Resources for the Social Studies is to provide a variety of interesting materials for senior high school social studies teachers. Another aim is to cultivate in the students an inquiry stance. The materials consist of modular units which are called episodes. Subject areas covered include sociology, psychology, economics, government, American history, world cultures, problems of democracy. The program began in 1964.

1970

SWITZER, WILSON

9-12 C-1 1 Powers Unified Science Program
Powers High School

James M. Doyle
G-2040 Carpenter Road
Flint, Michigan
48505

The objective of the program is to view science as a whole--not as a number of independent disciplines. The guiding philosophy of the program is to bring to the students ideas and concepts of science rather than mere factual content. The following four criteria have been set for the program: (1) The idea must be teachable on the high school level; (2) It must be approachable through the laboratory; (3) The concept must cross into two or more of the science areas; and (4) The concept must be able to be broken down into two three-week sections. There is some team-teaching going on with continuous team planning. Development began in 1965; the program was activated in 1970. Texts are chosen from Earth Science Curriculum Project, Introductory Physical Science, Physical Science Study Committee, Biological Sciences Curriculum Study, Chemical Education Materials Study, Harvard Project Physics and the Idea-Centered Laboratory Science and T.H.I.S. individualized programs.

1972

6-9 B-2 II Idea-Centered Laboratory Science
Western Michigan University

W. C. Van Deventer
Kalamazoo, Michigan
49001

Idea-Centered Laboratory Science is a three-year program designed to help students understand science. It consists primarily of open-ended laboratory experiences which are inquiry-related. The major ideas of science are presented and emphasized. It is thought that evaluation can be better completed through an analysis of the questions a student asks about the ideas, rather than his answers to questions the teacher asks. The program began in 1962 and is staffed by five people, including the writing staff. Idea-Centered Laboratory Science materials include student modules, teacher's guides and testing material. Idea-Centered Laboratory Science is designed for the non-science prone, or reluctant, student.

1972 IDEA-CENTERED LABORATORY SCIENCE

6-10 D-3 I Environmental Science — Gerald Putz
Macomb Intermediate — Mt. Clemens, Michigan
School District — 48043

It is believed that the material presented in a course dealing with a segregated discipline is too abstract, too difficult, and not stimulating. The curriculum is not relevant. The curriculum in the present program consists of two six-week modules which cut across the traditional disciplinary lines of biology, chemistry, physics, and earth science. It is essential that junior high school students are exposed to all fields of science for there is no guarantee that they will continue taking science in high school. The students are permitted to choose their own program of study and in this manner become interested in science. The program began in 1971 and today has 30 teachers and 120 classes.

1972

---

13 B-2 I Natural Science Curriculum for the Science Major — Gus J. Demas, Chairman
Macomb County Community College — Division of General Education
District Center Campus — 16500 Hall Road
Mt. Clemens, Michigan
48043

The program consists of a three-track science sequence for liberal arts students. The one-year course integrates natural science, humanities, social science, and communications. It is believed that this program will help students to view science as it is relevant for them. It will also illustrate the existence of science in every day life. The program began in 1968. There are six teachers and 620 students involved in the program.

1970

---

13 A-2 I Natural Science Curriculum for the Non-Science Major — Gus J. Demas, Chairman
Macomb County Community College — Division of General Education
District Center Campus — 16500 Hall Road
Mt. Clemens, Michigan
48043

It is believed that the needs of the majority of college students are not properly met by traditional science programs. For this reason, a science sequence was developed to accomodate students of all interests and abilities. The curriculum stresses the interrelationship of science with other disciplines and the relevance of science in everyday life. Individualized and self-instruction are emphasized. The program began in 1968. Instructional materials developed include text books, lab manuals, and individual instructional packages. The staff consists of five,and 1000 students participate in the program.

1972

11-12	B-2	II	Physics - Chemistry I & II Grace High School	Greg Balego 1350 Gardena Avenue, N.E. Fridley, Minnesota 55432

Of the belief that there is too much repetition and too little association of science materials, this program is attempting to change this by integrating physics and chemistry. In this way, the repetition will be avoided and the associations will be clear to the student. It is believed that this is a more logical format for the teaching of these disciplines. The program began in 1970. It is team-taught by two physics teachers and one chemistry teacher. It is geared toward the gifted student. There are 150 students currently enrolled.

1972

9-11	B-2	I	Science-Mathematics I, II, and III Grace High School	Greg Balego 1350 Gardena Avenue, N.E. Fridley, Minnesota 55432

This program, begun Fall, 1972, integrates biology, chemistry, physics, algebra I and II, geometry, and trigonometry into a logical, more relevant, sequence. It is hoped that an integrated program will not only eliminate needless repetition, but also draw important associations within these sciences. The course will be team-taught by a physics and mathematics teacher, and one qualified in science education.

1972

K-3,14	B-1	I-VI	Minnesota Mathematics and Science Teaching Program (MINNEMAST) University of Minnesota	James H. Werntz Center for Curriculum Studies Minneapolis, Minnesota 55455

Minnesota Mathematics and Science Teaching Project produces coordinated mathematics and science curriculum for grades K-6. The materials are being used both at the elementary level as curriculum and at the college level to teach future teachers how to teach coordinated mathematics and science. The project began in 1969 and is used actively in 125 schools, by 500 teachers and 25,000 students.

1970 WERNTZ, AHRENS, BRAY, MAXWELL, RISING, ROSENBLOOM, SUBARSKY

11-12	C-1		Moose Lake Unified Science Program Moose Lake High School	Michael Vogel Moose Lake, Minnesota 55767

This is a two-year integrated physics-chemistry course geared to the average student. There is also a one semester problems course, soon to be extended to a full year. The curriculum is taken from Harvard Projects Physics and Chemical Education Materials Study. The course began in 1971.

1972

10-12	B-1	II	Energy-Structure Life: A Learning System for Understanding Science St. Louis Country Day School	Louis W. Bixby 425 North Warson Road St. Louis, Missouri 63124

The objective of the program is to present an integrated physics-chemistry-biology course in a two-year sequence so structured as to indicate the interdependence of all sciences. Physics is basic to all of the sciences and chemistry is essential to understanding biology. The course is structured with this in mind, that the application of these understandings leads to an awareness of the influence and interaction of science on and with society. Begun 1962; team-taught 1962-67. There are four teachers involved, and 100 students. The course was begun using conventional texts, but now specially-written texts have been developed.

1972 BIXBY

9-12	A-C 1	I	Nebraska Physical Science Project University of Nebraska	Donald W. McCurdy, Director 211 Hanzlik Hall Lincoln, Nebraska 68508

The goal of the project is to develop curriculum and materials for a two-year integrated biological and earth science course. The course is based on the belief that each student has different interests and needs and therefore cannot be served by separate courses in biology, chemistry, and physics conducted on a whole class basis. The student should be permitted to pursue his own interests on an interdisciplinary basis, progressing at his own rate. The project began in 1968 and today employs 50 teachers, scientists, and education specialists. There are 40 classes and 1,000 students utilizing the program.

1972 FISHER, MCCURDY

10-12 C-1 II Millburn Unified Science
Millburn Senior High School

Leonard C. Blessing
Millburn Avenue
Millburn, New Jersey
07041

Science should be studied so as to show the interrelationships and dependence of one upon the other. The program is geared to students of all ability levels and covers a three-year period during which biology, chemistry, and physics are taught simultaneously--not in three separate disciplines. The program began in September, 1964. It is team-taught by four teachers who are now in the process of writing their own texts. The course consists of five classes and approximately 100 students.

1972

BLESSING

10-12 B-2 II Integrated Science
Barringer High School

Morris R. Lerner
Newark, New Jersey
07101

The integrated science program was initiated because of the belief that science in the real world is unified--not a number of separate disciplines. These courses teach science in an interdisciplinary manner and enable the students to become adept in the scientific processes. The integrated courses are divided into college bound and non-college bound students. The college bound program was begun in 1960; the non-college bound, in 1970. The ten classes are staffed by six teachers.

1972

7-9 B-1 II Time, Space, and Matter... Investigating the Physical World
Secondary School Science Project
Rutgers University

George J. Pallrand
10 Seminary Place
New Brunswick, New Jersey
08903

This science course developed by Secondary School Science Project emphasizes active participation in science rather than passive reading. Scientific themes are integrated into a sequential format. The processes of observation and interpretation are emphasized. This program is being used throughout the United States and materials are published by McGraw Hill Book Company.

1972

9-12	B-2	I	Unified Science - 4 Year Program Monmouth Regional High School	Norman Worthington 535 Tinton Avenue New Shrewsbury, New Jersey 07724

Scientific literacy is a major objective of this program. For science majors it strives to give them the foundation necessary to pursue their interest and to alert them to the multidisciplinary nature of science and technology. It is believed that the unified approach is more logical and flexible than the traditional disciplinary approach. The unified approach is centered around conceptual schemes. The program began in 1968. It is phase and team taught by a staff of six. One hundred fifty-two students participate in the program.

1972

13	B	II	Unified Science State University of New York	Robert G. Nurnberger 1400 Washington Avenue Albany, New York 12203
1-2				

The purpose of the program is to present an integrated view of science to the non-scientist. It is believed that the basic concepts common to all sciences are more valuable to the non-scientist than facts from the individual disciplines. The program began in 1964. There are six faculty members in the team-taught course, and approximately 200-400 students. The program has been suspended due to scarce resources.

1972 NURNBERGER, REYNOLDS, WARD

15		I	Center for Integrative Studies State University of New York	John McHale School of Advanced Technology Binghamton, New York 13901

The Center is primarily concerned with studies in the long-range social and cultural implications of science and technology. The Center acts as an information and communications center which will be linked to other similar programs and institutes within the State University of New York and other Universities. In addition, it provides a focus for graduate education and research. It also serves an international function as it exchanges pertinent information with various international centers. The Center issues series of working papers and reports derived from its ongoing studies.

1972

10-12	B-1	I	Engineering Concepts Curriculum Project - The Manmade World Polytechnic Institute of Brooklyn	E. J. Piel 333 Jay Street Brooklyn, New York 11201

This program emphasizes the use of "Systems" approach to solving social, personal, political and environmental problems. Course materials cover the fields of science, mathematics and social science. The development of technological literacy is another aim. Materials produced include a text, laboratory manual, and teacher's manual for the course. The materials can be purchased through McGraw-Hill Book Company. The course is geared toward average ability students. It was initiated in 1965.

1970

11-12	C-1	I	Foundations of Science State University of New York	Hiram Bleecker Physics Department Cortland, New York 13045

The underlying theory of the program is that education should be integrative--not integrated, and certainly not fragmented. Because of this, science is taught so as to provide the insights and techniques for continuous evaluation and synthesis of all experience. The program was begun in the fall of 1972. It was designed for non-science majors in their junior and senior years of high school. There is one section, fall term, with 40-50 students participating. The course is taught by Bleecker alone.

1972

11-12	C-1	I	Science and the Social World State University of New York	Hiram Bleecker Physics Department Cortland, New York 13045

The objective of the program is to examine the evolution and social impact of the major epistemologies and their manifestations in physics, art, music, literature, etc. The program runs on the theory that education should be integrative--not integrated, and definitely not fragmented. It should provide for the continuous evaluation and synthesis of <u>all</u> experience. The program, begun in 1962, is taught spring term each year. It consists of science and non-science majors in the 11th and 12th grades. There is one section of 45 students taught by Bleecker.

1972

9 B- II Integrated Science Approach
Mamaroneck High School

Gerald Merson
Mamaroneck, New York
10538

The program was initiated in order to develop a logical sequence of subject matter in science. Students should be made aware of the interrelationships between the disciplines. They should have necessary chemistry to study biology and the necessary physics for chemistry. The program's institution in the schools began September, 1972. It will be team-taught by three teachers; 75 students will participate.

1972

---

13 -2 I Building Educational Bridges Between Science and the Humanities and Fine Arts
Rensselaer Polytechnic Institute

V. L. Parsegian
Troy, New York
12181

This course strives to meaningfully interrelate the fields of art, engineering, physical sciences, social sciences, literature. The planning for the course began in 1971; classes will start February, 1973. Plans show staffing of one permanent teacher supplemented by visiting lecturers. The course could run for either one or two semesters.

1972

---

13 B II Introduction to Natural Science
1-2 Rensselaer Polytechnic Institute

V. L. Parsegian
Troy, New York
12181

The purpose of the project is to provide textbooks and teacher's guide for a course integrating the physical and life sciences. The two year course is intended for the first two years of college, for both science and non-science majors. In addition to integrating those disciplines, the course is striving to place the disciplines in a broader societal framework. The program began in 1965. Classes are being held at over 50 colleges where the newly produced materials are being used.

1972 KINERSON, LUCHINS, MELTZER, MONAGHAN, PARSEGIAN, SHILLING

---

13 B-C VI Science Education
1 Valley City State College

A. W. DeFoe (Head)
Chemistry Department
Valley City, North Dakota
58072

This program is still in the development phase. Its purpose is to provide science background for non-major teachers and to reach those previously disenchanted with science. There are approximately 100 students (three classes) involved in the program and two teachers.

1972

7-Grad	C-2	III	Institute for Environmental Education	Joseph H. Chadbourne 8911 Euclid Avenue Cleveland, Ohio 44106

The objective of the program is to get students and teachers to use environmental problems for an educational focus. In a study with such a focus, the students work as team members and share their work. They learn that there is something they can do about the problems. The program was also established to provide answers to environmental questions as a community service. The program, begun in 1967, now encompasses 80 schools, 200 teachers, and 4,000 students. It ranges from seventh grade to graduate work in college and offers a Masters of Urban Studies.

1972

12	C-2	II	Walsh Jesuit High School Interrelationships of Science and Society	James D. Maloney Daniel Pierce Box 400 Cuyahoga Falls, Ohio 44222

A program designed for high school seniors who have had biology and chemistry or biology and physics as well as three years of social studies. Forty students are currently involved in the program which combines activities in social studies and science through which the student considers the problems that our society confronts today. The student is asked to formulate possible solutions to these problems. This problem-oriented course is based on the premise that "all our problems lie in value conflict" and that we live in a time that "dictates that one's education take a futuristic view."

1973

10-12	D-2	III	Space Science Lakewood Senior High School	John Wood Lakewood, Ohio 44107

This program unites biology, astronomy, mathematics, earth science, social science, and industrial arts in the study of space. The program began in 1968. Five teachers work together, each qualified in one of the areas listed above. There are approximately 130 students involved in the program.

1972

7-8 C-2 I Newton Falls Environmental Science Studies
Newton Falls Catholic Elementary School

Sr. Marylin Lisowski
R.D. #1, Box 9A
Newton Falls, Ohio
44444

This environmental program is directed towards "unifying the sciences" through an environmental studies program that would lead students to an appreciation and responsive involvement in environmental issues. Processes of observation and inquiry are stressed in investigating phenomena and problem areas of Newton Falls. The program is team taught by a science teacher and a member of social studies and fine arts department to one 8th grade class. Plans are to expand it to 7th and 8th grades.

1973

---

14 B-2 VI General Studies Program

Larry Shelt
Douglas Road
Toledo, Ohio
43613

This program, conducted at the Summer Institute of the University of Toledo, is designed to prepare secondary teachers in unified science education. There are four teachers and five student teachers for the course. It is team-taught. The course began Summer, 1971.

1972

8-9 B-C 1 II Unified Science
Westlake Public Schools

Joseph T. Wanosik
Borneson Junior High
Westlake, Ohio
44145

Junior high school science should serve as a bridge between generalized elementary science and specialized secondary science. Junior high school is an appropriate time to study interdisciplinary science. This program is structured around major ideas and concepts which permeate the major disciplines, and is laboratory-centered. The program was begun in 1971 and has 300 eighth-grade, and 240 ninth-grade students.

1972

8-12	B-C	II	Catlin Gabel Project Catlin Gabel School	Lowell G. Herr 8825 S.W. Barnes Road Portland, Oregon 97225

The guiding philosophy of the project is that biology, chemistry, and physics are interrelated and that each is necessary to the complete comprehension of the other. Thus, the typical bio-chem-physics sequence does not provide optimum learning conditions. A five-year integrated program has been developed in which the disciplines are taught simultaneously in terms of concepts. The program began in 1965 and is team-taught by five teachers. There are nine classes with a total of 130 students. The instructional materials are chosen from among Physical Science Science Study Committee, Chemical Education Materials Study, Biological Sciences Curriculum Study, Chemical Bond Approach, etc.

1972

13	B-1	II	CORE - Course for College Science Majors Containing Physics, Chemistry, Biology Portland State University	Arnold D. Pickar Associate Professor of Physics Portland, Oregon 97201

This course provides two-year preparation for all college science majors. It is based on the belief that a science major needs to be aware of the interdisciplinary nature of science. It is also thought that an interdisciplinary approach will raise the efficiency level of introductory courses. The program was initiated in 1966. It is taught in a team effort by a physicist, chemist and biologist. Student enrollment numbers approximately 30 per year.

1972 PICKAR

9-12	B-2	I	Portland Project Portland State University School of Education	Michael A. Fiasca P.O. Box 571 Portland, Oregon 97207

The purpose of the program was to develop a three-year integrated secondary science sequence including biology, chemistry, physics, environmental science and behavior science. Integration is achieved in three ways: (1) logical content, development from a number of science disciplines, (2) science process, and (3) problem solving through exploration of the environment. This program is geared toward the average and higher ability student; it is hoped that a program can be developed for the lower ability student as well. The project was started in 1962 and is team-taught. Approximately 3,000 students are involved. A newsletter is published by the project.

1972

13 A-2 I Student-Designed Unitized Instruction

Philip R. Pennington
3066 S.W. Flower Terrace
Portland, Oregon
97201

The purpose of the project was to design instructional units (mini-courses) for use as reference materials. It is believed that science will be more relevant to everyday life if it is studied in an interdisciplinary manner. The program was cut in 1970. Classes are no longer being held, but work is still being conducted on designing units. Attempts are in process to reinstate the teaching program.

1972

PENNINGTON

11-12 B-1 III Pennsylvania Nuclear Science Project
Bureau of General and Academic Education
Pennsylvania Department of Education

John J. McDermott
P.O. Box 911
Harrisburg, Pennsylvania
17126

This course serves as an enrichment program for science oriented students of high academic ability. Prerequisites for the course are completion of both chemistry and physics, or completion of one and current enrollment in the other; mathematics beyond algebra II. The course integrates nuclear physics, nuclear and radiochemistry, radiation biology, and radioisotope applications. The project began in 1967 and has been instituted in 21 schools. Over 269 students are involved.

1970

---

11 B-1 I Science for Non-Science Majors (SNSM)
Pennsylvania Department of Education

Irvin T. Edgar
Box 911
Harrisburg, Pennsylvania
17126

It is thought that the study of science should revolve around the present events and problems of society, and not be limited by past definitions or divisions of science. Science should be viewed from an objective viewpoint, free from academic requirements. Emphasis is placed on population, pollution, and social problems of science origin. All students must realize the place of science in society and the responsibility which they have toward the community. The project began in 1968 and has been established in six schools, Eight teachers and 400 students are involved in the curriculum.

1970

10-12	C-	Unified Science Pilot Program Pennridge High School	Sheldon Yoder 1400 5th Street Perkasie, Pennsylvania 18944

Now piloting a unified science program in two tenth grade sections with the intention of developing a 10-12 sequence of unified science. Program is team-taught.

1973

K-8	A-1	I	Individualized Science Learning Research and Development Center	Leopold E. Klopfer 160 North Craig Street Pittsburgh, Pennsylvania 15213

This program seeks to develop a complete individualized science program to serve students from kindergarten to high school. Elementary science should help to orient the student to his environment; he should learn to ask meaningful questions. The program helps him to relate science and society. A pervasive goal is to develop his scientific literacy. The program began in 1964. There are 35 teachers (one teacher and one aide for every classroom) and 900 students.

1972

9	B-2	II	Quantitative Physical Science (QPS) Department of Education Duke University Durham, North Carolina	Dr. Sherwood Githens, Jr. Professor, Science Education College Station, Texas 27708

The purpose of this program is to develop a "sequence" of simple measurement operations using a specially-designed textbook. This is intended to lead the student to an understanding of the instrumentation, measurement, analysis, and communication media of all of science and engineering, and at the same time, teach some basic physics, chemistry, and applied mathematical concepts. The program is designed for general education and anyone who will later take courses in science, engineering, mathematics, biology, and medicine. Materials may be adjusted to varying needs of students. Efforts have been made to produce a "hands on" program that is economical to adopt. In 1973, 80 teachers and 8,000 students were involved in this project. Written materials may be purchased from the project.

1973

9,10,12	B-2	I	The Development and Implementation of a Four-Year, Unified, Concept-Centered Science Curriculum for Secondary Schools Monona Grove High School	Carl H. Pfeiffer Science Department 4400 Monona Drive Monona Grove, Wisconsin 53716

This project established unified science as an alternative to traditional science at Monona Grove High School. It is believed that a unified, concept-oriented approach to high school science is more effective than a subject-oriented approach. The project began in 1964. The course has an enrollment of 714 at Monona Grove High School, and is taught by a staff of seven.

1970

PART II: ABSTRACTS OF STUDENT INSTRUCTIONAL MATERIALS RELATED TO UNIFIED SCIENCE EDUCATION

Explanation of coded information on entries in this section

Einstein, Albert ED 999999 SE 543210 1987 28 pp.
The Ultimate Science Course Institute for Universal Study
Princeton, South Dakota

(abstract of document)

EDRS .65/3.29, FUSE

Einstein, Albert = Author
ED 999999 = Reference number used in reporting this article in Research in Education and the identification number used for microfiche or hard-copy retrieval from ERIC collections or agencies. If number is missing, document is not in system.
SE 543210 = Reference number used by ERIC Center for Science, Mathematics, and Environmental Education. Used only in locating documents in Columbus center. If number is missing, document is not in system.
1987 = Date of publication of original document
28 pp = Number of pages in publication
The Ultimate Science Course = Title
Institute for Universal Education = Publisher or source of document. If an article is in a journal, the journal title will appear here.
Princeton, South Dakota = Location of publisher
EDRS .65/3.29 = Cost of obtaining copy from: ERIC Document Reproduction Service
P.O. Drawer 0
Bethesda, Maryland 20014
.65 = cost of microfiche
3.29 = cost of hard-copy
Note: Payment must accompany orders under $10.00 and all orders must be in writing. Extra charge for first class or foreign postage.
FUSE = Alternative source of document (there is usually a charge for copying which would exceed the EDRS price.)

Amend, John R. SE006465 1968 332pp
The Evaluation of an Integrated Advanced Atomic and Nuclear Science Laboratory Block Program at the High School Level
United States Office of Education
Reports on the development and evaluation of directed laboratory blocks in advanced physical science. Gives student materials. Topics have relevance for several traditional science subjects. Among topics are: beta energy determination, absorption of nuclear radiation, colorimetry. Most activities require fairly expensive equipment. Real focus is on instrumentation.

SMEAC

American Foundation for Continuing Education 1963 457pp
(Editor - Louise B. Young)
Exploring the Universe McGraw-Hill
This is a selection of readings directed to adults and intended to enable the audience (or class using it) to develop a modern outlook on the nature of science. Parts deal with questions as "Is there a scientific method?," "Is there an order in nature?," and "How was the universe created?"

FUSE

Australian Science Education Project ED055892 SE012594 1971 95pp
Unit: Charge, First Trial Materials, Inspection Set
The first trial edition of the Australian Science Education Project unit introducing the concepts of electrical charge consists of a student workbook, question booklet and a response sheet, and a booklet containing answers to the questions in the workbook and question booklet. The teacher's guide outlines the unit, lists suggested teaching techniques and necessary apparatus for the core activities and each of the six options available to students, and lists expected outcomes of the unit. The core activities lead to the generalization that like charges attract and unlike charges repel. The options concern the effects of charges in industry and everyday life, a model of ionic crystals, electroplating, electric cells, tests of electrolytes, and the historical development of the concepts of charge (Franklin, Volta, Valvani). The emphasis throughout is on individual or small group self-paced experimentation using the student booklet as a guide.

FUSE

Australian Science Education Project SE013144 1971 85pp
Unit: Made to Measure, First Trial Materials, Inspection Set
These materials form a service unit for students in grade seven science courses in Australian secondary schools. The teacher's guide lists the expected knowledge, skills, and attitudinal outcomes; suggests methods of facilitating student investigation, lists materials needed for each activity; and suggests additional references for student and teacher. One of the pupil books contains instructions for activities concerned with the estimation and measurement of volume, length, temperature, and time. Answers to questions and records of activities are made in a pupil record book, which also contains summaries of the important ideas that are expected to be developed. There is a self-administered diagnostic test with comments on each choice in a separate answer section.

FUSE

Australian Science Education Project 1971 111pp
Unit: Males and Females, First Trial Materials, Inspection Set
This is one of the many modular units produced by ASEP. This unit is expected to take 15 to 20 ninety-minute periods to complete. It was written to teach students about human sexuality and reproduction. The packet includes the Teacher's Guide, and student learning module.

FUSE

Australian Science Education Project ED049931 SE011122 1971 95pp
Unit: Messengers, First Trial Materials, Inspection Set
The Australian Science Education Project is producing material designed for use in grades 7-10 of Australian schools. This is the first trial version of a unit concerned with sight, hearing, touch, taste, and smell. The teacher's guide outlines the use of the two booklets ("Messengers" and "Use of the Senses") intended for all students, where students produce their own sense profiles by measuring optical resolution, heat point, angle of vision, sound frequency range, judgement of sound duration and direction, taste sensitivity, texture and thickness discrimination, and reaction time, and suggests ways of using the optional activities included in the student booklets "How to be More Sense-ible," and "Senses in Other Living Things." Worksheets are provided for most activities. Included is an evaluation booklet with multiple choice and free response questions, some in a programmed format.

Australian Science Education
Project
11 Glenbervie Road
Toorak, Victoria AUSTRALIA

FUSE

Australian Science Education Project ED049930 SE011121 1971 142pp

Unit: Mice and Men, First Trial Materials, Inspection Set

The Australian Science Education Project is producing a series of units designed for use in grades 7-10. This first trial edition contains a teachers guide providing an overview of the unit and advice on mice management and classroom organization; booklets for students ("Mammals," "Investigations," "Care and Handling of Laboratory Animals," "Background Work," and "Check Your Answers"); 14 student worksheets; a student's guide to the unit, and a device for measuring mice tails. Morphological, physiological, and behavioral investigations are included as well as some exercises on classification. Student instruction varies from highly specific directions to suggestions of ideas that might be followed. The answer booklet emphasizes that students may not all get the same results in their experiments. The background work emphasizes the interrelationships of mice and men.

Australian Science Education Project
11 Glenbervie Road
Toorak, Victoria AUSTRALIA (Free)

FUSE

Australian Science Education Project ED053990 SE012336 1971 125pp

Unit: Microbes, First Trial Materials, Inspection Set

The Australian Science Education Project is producing materials designed for use in grades 7-10 of Australian schools. This is the first trial version of a unit investigating microbial action. One of the student booklets contains instructions for the activities demonstrating food decay which all students are expected to complete. The other student booklet, accompanied by worksheets, contains suggestions for ten optional activities concerned with the effects of bacteria and fungi, their uses in food processing and role in ecological cycles, and a historical study of Pasteur's work. Objectives for the unit, suggestions for instructional organization, reference and materials lists for each activity, and methods of organizing discussion are included in the separate teacher's guide. A test booklet and a sheet of answers, including diagnostic comments, are available.

FUSE

Australian Science Education Project ED058059 SE013134 1971 230pp

Unit: Minerals and Crystals, First Trial Materials, Inspection Set

This unit, one of a series being developed for Australian secondary school science courses, consists of a teacher's guide, two student booklets, a test booklet, and a student workbook which also contains answers to questions raised in the student booklets, and an answer sheet containing comments on the answers to the questions in the test booklet. Student booklet 1 contains instructions for growing crystals and comparing them with minerals and is considered a basic part of the unit. Student booklet 2 contains eight optional activities, from which students are expected to choose at least two or three. These activities are titled "Looking for Minerals," "Growing Large Crystals," "Common Rock Minerals," "Mysterious Minerals," "What is it?" "Patterns Abound," "Gems," and "Minerals in the Service of Man." All activities in the basic and optional sections use a student-centered inquiry approach, and the teacher's guide suggests methods of advising and consulting with students and of providing introductory demonstrations.

FUSE

Australian Science Education ED053991 SE012337 1971 95pp

Unit: Plants,First Trial Materials, Inspection Set

The Australian Science Education Project is producing materials designed for use in grades 7-10 of Australian schools. This is the first trial version of a unit introducing the study of plants. The section to be completed by all pupils, contained in the first of the student workbooks, emphasizes observation of specimens on school grounds and on excursions, introducing the student to plant diversity and the idea of adaptation. There are also some exercises on germination and growth. Guidance given students is reduced in the second booklet, which contains ideas for 12 optional student investigations. A test booklet, and answer and worksheets are provided. The teacher's guide contains an overview of the unit; its affective, psychomotor, and cognitive objectives; and methods of integrating this unit with others in the series. Detailed lists of material and references necessary or useful for each of the exercises accompany suggestions for organizing classroom and field activities.

FUSE

Australian Science Education Project 1971 148pp

Unit: Rocks from Sediments

This is one of the many modular units produced by ASEP. This unit is expected to take 20 forty-minute periods to complete. It was written to teach students about the non-living natural environment, man's use of it, and the consequences of his use. The packet includes the teacher's guide and student learning module.

FUSE

Australian Science Education Project ED056915 SE012792 1971 160pp

Unit: Sticking Together, First Trial Materials, Inspection Set

These materials, including teacher's guide, student test booklet and laboratory guide, student workbook, test booklet, and a booklet explaining the answers to the questions in the test booklet, are first trial versions of a unit that will form part of the Australian Science Education Project instructional materials for grades seven through ten. The emphasis is on student investigation of simple phenomena, leading to the development and application of a model of particulate adhesion and cohesion. There is a short core portion all students are expected to complete, and nine options from which students may choose. Topics investigated include: wetting, capillarity, adhesives, detergents, lubrication, strength of soap films, viscosity, monomolecular layers, and chromatography. The teacher's guide contains suggestions for organization of the unit, a bibliography and film list, equipment list, and notes on the activities suggested in the student's manual as well as ideas for additional activities that may be added or substituted.

FUSE

Australian Science Education Project 1972 30pp

Unit: Where Humans Come From

This is one of the many modular units developed by ASEP. This unit is expected to take 20 twenty-minute periods to complete. It was written to teach students about the origins of humans, evolution, and the future of human beings. The packet includes the teacher's guide and student learning module.

FUSE

Australian Science Education Project ED053993 SE012340 1971 35pp

Unit: Using a Microscope (Student Booklet and Teacher's Guide)

The Australian Science Education Project is producing material designed for use in grades 7-10 of Australian schools. This is the first trial version of a unit providing instruction in microscopy. Illustrations of each step in setting up, focusing, preparation of mounts, microscopic measurement, and cleaning and packing the microscope are included in the student's booklet. The accompanying teacher's guide suggests precautions to follow in classes using microscopes, illustrates variations in microscope structure likely to be found in brands in use, and suggests some approaches to the use of this unit. The unit is not intended to introduce optical theory, but is a service unit to provide students with additional skills for use in investigative laboratories.

FUSE

Bethane, Paul and Others SE000709 1964 20pp
Nova Junior High Science Sequence - Unit 1: Student Processes
Nova High School
Fort Lauderdale, Florida
$3.00 (entire 300 pp. sequence)

This is the first module in a sequence of units for junior high unified science. In unit one, the student learns simple laboratory procedures. The module details behavioral objectives, assigns selected reading and laboratory experiments.

FUSE

Bethane, Paul and Others SE000709 1964 73pp
Nova Junior High Science Sequence - Unit 2 - 7: Organization
Nova High School
Fort Lauderdale, Florida
$3.00 (entire 300 pp. sequence)

These six modules are part of a larger sequence for junior high unified science. These units deal with the organization of elements and atoms (but not atomic structure), the organization of biology, classification, and the organization of physics. The modules contain selected readings and laboratory experiments.

FUSE

Bethane, Paul and Others SE000709 1964 55pp
Nova Junior High Science Sequence - Units 8-11: Beginnings
Nova High School
Fort Lauderdale, Florida
$3.00 (entire 300 pp. sequence)

These four modules are part of a larger sequence for junior high unified science. These units deal with substantiation and interpretation for various theories of evolution. The modules contain selected reading and laboratory activities.

FUSE

Bethane, Paul and Others SE000709 1964 71pp
Nova Junior High Science Sequence - Units 12-17: Fundamental Particles
Nova High School
Fort Lauderdale, Florida
$3.00 (entire 300 pp. sequence)

These seven modules are part of a larger sequence for junior high unified science. These units deal with the fundamental particles of science: cells, atoms, electric charge, and molecules. The modules contain study guides, selected readings, laboratory exercises, and suggestions for further study.

FUSE

Bethane, Paul and Others SE000709 1964 30pp
Nova Junior High Science Sequence - Units 18-20: Search for Reason

Nova High School
Fort Lauderdale, Florida
$3.00 (entire 300 pp. sequence)

These three modules are part of a larger sequence for junior high unified science. These units are an explanation of the use of modules for making order out of chaos. Crystal structure and organic chemistry are studied and models are constructed. Selected readings and laboratory activities are included in the modules.

FUSE

Bethane, Paul and Others SE000709 1964 71pp
Nova Junior High Science Sequence - Units 21-22: Explanations Through Probability and Statistics

Nova High School
Fort Lauderdale, Florida
$3.00 (entire 300 pp. sequence)

These two modules are part of a larger sequence for junior high unified science. These units deal with the gas laws, the kinetic molecular theory, the derivation of absolute zero, concentration versus rate of reactions, and temperature as a factor of reaction speed. Selected readings and laboratory activities are included in these modules.

FUSE

Bixby, Louis W.
Energy Exchange - Material Exchange - Cell Structure: Chapters 18-20

These are three chapters from a larger text for a one-year unified science program. These chapters deal with energy exchange, reproduction, and cybernetics. Each chapter consists of selected readings, questions, and experiments. This volume has been updated by a second edition.

FUSE

Bixby, Louis W. and Others 1965
Energy - Structure - Life

St. Louis Country Day School
St. Louis, Missouri

This text was created with the purpose of integrating high school biology, chemistry, and physics into one two-year course. The authors are of the conviction that science is one discipline; this is a programmed text. The student learns on his own with assistance from teachers; it replaces lectures. The text is divided into 33 chapters, each consisting of the textual reading and experiments. Each of these may be considered an individual learning module. This volume has been updated by a second edition.

FUSE

Bixby, Louis W. and Others 1965
Energy - Structure - Life: Chapters 1-7

St. Louis Country Day School
St. Louis, Missouri

This programmed learning text outlines the integrated high school science program at St. Louis Country Day School. The first volume covers Chapters 1-7. Each chapter may be considered a modular teaching unit, having reading sections, questions, and laboratory activities. This volume has been updated by a second edition.

FUSE

Bixby, Louis W. and Others 1965
Energy - Structure - Life: Chapters 8-12

St. Louis Country Day School
St. Louis, Missouri

This programmed learning text outlines the integrated high school science program at St. Louis Country Day School. The second volume covers Chapters 8-12. Each chapter may be considered a modular teaching unit, having reading sections, questions, and laboratory activities. This volume has been updated by a second edition.

FUSE

Bixby, Louis W. and Others SE013547 1971 253pp
Energy - Structure - Life: A Learning System for Understanding Science, Book I

St. Louis Country Day School
St. Louis, Missouri

This programmed learning text outlines the integrated high school science program at St. Louis Country Day School. The first of the two volume set covers Chapters 1-13. Each chapter may be considered a modular teaching unit, having reading sections, questions, and laboratory activities. This volume is a second edition, updating the 1965 volume.

FUSE

Bixby, Louis W. and Others SE013549 1971 282pp
Energy - Structure - Life: A Learning System for Understanding Science, Book II

St. Louis Country Day School
St. Louis, Missouri

This programmed learning text outlines the integrated high school science program at St. Louis Country Day School. The second of the two volume set covers Chapters 14-23. Each chapter may be considered a modular teaching unit, having reading sections, questions, and laboratory activities. This volume is a second edition, updating the 1965 volume.

FUSE

Bixby, Louis W. and Others 1965
Energy - Structure - Life: A Unified Approach to the Nature of Science - Prospectus
St. Louis Country Day School
St. Louis, Missouri

This collection of materials from the St. Louis Country Day School gives an overview of their integrated science program. The collection begins with an introduction explaining the purposes and format of the program. This is followed by an exemplary module, "Atoms - Properties - Periodicity." Program rates, laboratory exercises, teacher notes, and sample tests are all provided. This volume has been updated by a second edition.

FUSE

Craeger, Joan and Darrel Murray ED052063 SE012067 1971 173pp
The Use of Modules in College Biology Teaching

The components, advantages and applications of modules (self-contained independent units of instruction focusing on a few well defined instructional objectives) in teaching college biology, including their use in investigative laboratories are illustrated by five modules on a variety of topics. The illustrations reproduce written materials used in the modules and provide transcripts of the audio-tape segments used in some. Descriptions of modularized programs, some speculation on their future place in instruction, details of sources of information on module production, and two bibliographies, (on audiotutorial methods and the use of behavioral objectives and individualized instruction) are included in this report. In some cases, data from preliminary evaluations of the technique are included in the descriptive reports.

CUEBS Free

Department of Public Instruction, Lansing, Michigan 1965 33pp
Open-Ended Laboratory - Centered Science for Grades 7-8-9:
NDEA Title III-#313

The aim of this program is to present science through an interdisciplinary approach by using open-ended laboratory experiences. In the program, the students are given few instructions and little direction; they work on their own. This booklet contains 17 of these modular experiments concerning gradients, normal curves, measurement, dynamic interdependence and interrelationships in the natural world, and extensions of man's bodies. Supplementary booklets deal with Nature or Nuture?, Evolution and Directional Change, Dynamic Equilibrium Cycles, Change and Variation, and Extrapolation and Interpolation. A booklet of sample tests for a number of the modules is also available.

FUSE

Dodge, Richard and Robert McDonald ED052063 SE012067 1971 151-155pp

"An Excerpt from an Audio-Tutorial Package"

in The Use of Modules in College Biology Teaching by Craeger and Murray. This is one of five sample modules contained in a larger work. This audio-tutorial module is designed to be completed in three weeks. It contains lectures on the sources of raw materials for plant metabolism, the processes of plant metabolism itself, and plant growth and regulation, with plant reproduction to be studied in the next module. List of instructional objectives, laboratory exercises, and supplementary activities are provided along with the tape which has been transcribed in the article.

CUEBS Free

Housinger, Jan Kenneth and Others 1965 239pp

Syllabus for Natural Science, Freshman Year 1964-1965

This course syllabus contains four sections: Study Guide, Investigations, Reading Selections, Natural Science notes and ideas. The last section is to be supplied by the student himself--a compilation of notes and information for future reference. This section will be as creative and useful as the student makes it. The student will proceed through each of the four sections simultaneously. The subject matter of the course is divided into four blocks: Observation and Measurement, Classification, Theory Building: Search for Explanations, Theory Building: Structuring Models; the first two are presented here. The objectives of the course are twofold: to gain an understanding of scientific inquiry, and to acquire insight into ideas, principles and theories of natural science. The course and syllabus are arranged to expedite the learning of these objectives.

FUSE

Housinger, Jan Kenneth, and Others 1966 167pp

Syllabus for Natural Science, Freshman Year 1965-1966

This course syllabus contains four sections: Study Guide, Investigations, Reading Selections, Natural Science notes and ideas. The last section is to be supplied by the student himself--a compilation of notes and information for future reference. This section will be as creative and useful as the student makes it. The student will proceed through each of the four sections simultaneously. The subject matter of the course is divided into four blocks: Observation and Measurement, Classification, Theory Building: Search for Explanations, Theory Building: Structuring Models; the first two are presented here. The objectives of the course are twofold: to gain an understanding of scientific inquiry; and to acquire insight into ideas, principles and theories of natural science. The course and syllabus are arranged to expedite the learning of these objectives.

FUSE

Kurtz, Edwin B. ED052063 SE012067 1971 157-166pp
"Excerpts from Biology--An Individualized Approach"
in The Use of Modules in College Biology Teaching by Craeger and Murray
This is one of five sample modules contained in a larger work. This module deals with general college biology. It contains objectives, rationale, activities and a competency test for each lesson. It is intended to replace classroom work. The student begins at his own level of competence and works at his own pace. Laboratory work is required once each week.

CUEBS Free

Ministry of Education and Culture, India 1971 69pp
Let's Grow Plants "Yachtav," Israel Publishers Association
Tel Aviv, Israel
This booklet describes the rationale and objectives of the Israeli program, "Agriculture as Environmental Science" and also provides exemplary instructional materials. Agriculture is approached as applied biology, an environmental science, because the success of the farmer depends on his ability to adapt to new conditions. The course is structured around a number of conceptual units. Inquiry method is employed. Instructional materials include students' text, students' worksheets, teachers' guide, teachers' magazine, apparatus.

FUSE

Monona Grove Unified Science Program 233pp
Science III: Matter-Energy Interactions In Natural Systems
This is a collection of materials for 11th grade unified science. The course is divided into three parts: Extensions of the Particle Theories, Energy-Time Relationships in Particular Systems. Each part is further divided into small units. The material for each unit includes discussion questions, laboratory exercises, and review.

FUSE

Monona Grove Unified Science Program 271pp
Science IV: Homeostatic Systems - Mechanisms For Survival
This is a collection of materials for 12th grade unified science. The course is divided into three parts: Extension of Energy-Force Relationships, Mechanisms for Matter-Energy Interactions in Living Organisms, Behavioral Patterns of Living Organisms. Each part is further divided into small units. The material for each unit includes questions, exercises, laboratory investigations, and review.

FUSE

Montag, Betty Jo 1965 126pp
Matter, Motion, and Man: An Experimental Program in General Science, Volume I
This is the first of a three-part series in general science. The purpose of this paper is twofold: to acquaint biology, chemistry, and physics students with the new approaches in these fields; and to help those students not going on in science to gain a better understanding of themselves and the world around them. This unit is divided into five sections: Process, Program, and Progress; Why Digits, Data, and Devices; Mass, Motion, and Forces; Electrons, Elements, Energy; Matter, Motion, and Molecules. Together, they give a good, general view of science. At the end of each reading section, there are practice drills and laboratory exercises. The scientific processes are studied early in the course, with chemical reactions and pendulums coming later.

FUSE

Montag, Betty Jo 1965 150pp
Matter, Motion, and Man: An Experimental Program in General Science, Volume II
This is the second of a three-part series on general science. The purpose of this paper is twofold: to acquaint biology, chemistry, and physics students with the new approaches in these fields; and to help those students not going on in science to gain a better understanding of themselves and the world around them. This unit is divided into six sections: Chaos to Classification; DNA Destiny and Determination; Plants, Planaria, and Parasites; Light, Lenses, and Lasers; Photon to Photosynthesis; Hot, Hotter, Hottest. Together, they give a good general view of science. At the end of each reading section, there are practice drills and laboratory exercises. The topics in this unit range from classification, to DNA, plants and photosynthesis, and light. There is a bibliography of reading material at the end of the volume.

FUSE

Montag, Betty Jo 1964 101pp
Matter, Motion, and Man: An Experimental Program in General Science, Volume III
This is the third of a three-part series in general science. The purpose of this paper is twofold: to acquaint biology, chemistry, and physics students with the new approaches in these fields; and to help those students not going on in science to gain a better understanding of themselves and the world around them. This unit is divided into five sections: Embryology, Skeletal, and Muscular Systems; Food, Fuel, and Fitness; Blood, Brains, and Beauty; Frog. Together, they give a good, general view of science. At the end of each reading section, there are practice drills and laboratory exercises. The topics in this unit range from embryology to the skeletal system, blood, the brain, and a study of frogs.

FUSE

Pfeiffer, Carl ED053946 SE012152 1968 362pp

Homeostatic Systems-Mechanisms for Survival

Science IV

Monona Grove High School
Monona Grove, Wisconsin

The two student notebooks in this set provide the basic course outline and assignments for the third year of a four year senior high school unified science program. This course is the less technical of the two third-year courses offered in the program. The first of the three major units in this course, Structure and Dynamics of the Biosphere, is composed of three subunits: the nature and scope of ecological science, the ecosystem, and man in the biosphere. The second unit, Population Structure and Dynamics, contains four subunits: structure and organization, the functioning of populations, population genetics, and human populations. The third unit, Problems of Coexistence, contains these subunits: problems of coexistence with the physical environment, with other organisms, and within society. The final subunit of the course is Science and the Evolving Society. The notebook materials for each of the subunits include: a list of required and recommended readings from various other books; questions for consideration in introducing a lesson; a brief background reading; a basic outline of the lectures with space provided within the outline for notes; laboratory problem reports and other kinds of assignments (discussion questions, fill-ins, problems); and summary statements and review questions. Numerous diagrams and illustrations are included.

EDRS .65/13.16

Pfeiffer, Carl ED053945 SE012151 1968 320pp

The Interaction of Man With His Environment

Science III and IIIB

Monona Grove High School
Monona Grove, Wisconsin

The two student notebooks in this set provide the basic outline and assignments for the fourth and last year of a senior high school unified science program which builds on the technical third year course, Science IIIA (see SE012149). An introductory section considers the problems of survival inherent in living systems, matter-energy interactions relating to living systems, life and the laws of thermodynamics, and homeostasis. The first unit, Matter-Energy Relationships of the Electron, focuses on interactions involving circular movement, translational movement, and movements between electric and magnetic fields. The second unit, Mechanisms for Matter-Energy Interactions in Living Organisms, considers those mechanisms associated with the capture, storage and utilization of energy and matter, transport, regulation and exchange of matter, and other functions in living organisms. The materials for each of the subunits include: a list of required and recommended readings from various other books; questions for consideration in introducing a lesson; a brief background reading; a basic outline of the lectures with space provided within the outline for notes; laboratory activities and investigations; laboratory problem reports and other kinds of assignments (discussion questions, fill-ins, problems); and summary statements and review questions. Numerous diagrams and illustrations are included.

EDRS .65/13.16, FUSE

Pfeiffer, Carl ED053943 SE012149 1968 271pp
Matter-Energy Reactions in Natural Systems
Science III and IIIA Monona Grove High School
Monona Grove, Wisconsin

The two student notebooks in this set provide the basic outline and assignments for the third year of a four year senior high school unified science program. This course is the more technical of the two third-year courses offered in the program. The first unit, Extensions of the Particle Theories, deals with slide rule review, molecular theory and the gas laws, mole concept, chemical periodicity, chemical reactions and related concepts and problems. The second unit, Energy-Time Relationships in Macrosystems, presents an analysis of vector quantities, interactions in static equilibrium systems, and interactions in dynamic systems. The third and final unit, Energy-Time Relationships in Particulate Systems, is concerned mainly with chemical energy distribution, reaction rates, and chemical equilibrium. The materials for each of the subunits include: a list of required and recommended readings from various other books, questions for consideration in introducing a lesson; a brief background reading, a basic outline of the lectures with space provided within the outline for notes; laboratory activities and investigations; laboratory problem reports and other kinds of assignments (discussion questions, fill-ins, problems); and summary statements and review questions. Numerous diagrams and illustrations are included.

EDRS .65/9.87, FUSE

Pfeiffer, Carl H. ED053981 SE012308 1971 329pp
Science I: Matter - Energy and the Process of Change
This is a collection of materials for ninth grade unified science. The course is divided into six parts and each part is further divided into small units. The material for each unit includes discussion questions, exercises, and laboratory work. A list of required readings is also included.

EDRS .65/13.16, FUSE

Pfeiffer, Carl H. ED053982 SE012309 1971 143pp
Science IIA: Matter - Energy Interactions Relating To Life On Earth
This is a collection of materials for 10th grade unified science. The course is divided into three parts: Origins of Life, Evolution of Life, and Continuity of Life. Each part is further divided into small units. The material for each unit includes discussion questions, exercises, laboratory work, and review.

EDRS .65/16.45, FUSE

Pfeiffer, Carl H. ED053982 SE012309 1971 344pp
Science IIB: Matter - Energy Interactions Relating To Life On Earth
This is a collection of materials for 10th grade unified science. The course is divided into three parts: Origins of Life, Unity and Diversity of Life, Continuity of Life. Each part is further divided into small units. The material for each unit includes discussion questions, exercises, laboratory work, and review.

EDRS .65/16.45

Schools Council Integrated Science Project 1971
SCISP Background Books, Trials Version
These books correspond to various SCISP modular packets. Those available in the FUSE office are: Electrification of British Rail, Human Behavior, Machines and Engines, Man In Space, Patterns of Population, Patterns of Reproduction Development and Growth, and Sound: Its Uses and Misuses.

FUSE

Schools Council Integrated Science Project 1972
SCISP Investigations Booklets, Trial Version
These booklets correspond to various SCISP modular packets. Those available in the FUSE office are: A Detergent Story, The Polythene Story, and The Gatwick Airport Story.

FUSE

Schools Council Integrated Science Project 1971 18pp
SCISP Packet 0, Confidential Trials Version
This packet is the first of the SCISP series on "Patterns." It consists of a pupils' manual and teachers' guide, and has corresponding background books and investigation booklets. The module contained in this packet is entitled "Patterns and Problems" and is broken down into a number of subunits.

FUSE

Schools Council Integrated Science Project 1970 98pp
SCISP Packet 1, Sample Schemes Sections 1-4
This packet belongs to the SCISP series on "Patterns." It consists of a pupils' manual and teachers' guide, and has corresponding background books and investigations booklets. The modules contained in this packet are: the earth and life, crystals and atoms, molecules, and cells. Each module is broken down into a number of subunits.

Schools Council Integrated Science Project 1971 106pp
SCISP Packet 1A, Sample Scheme New Sections 2,3,4,7, and 10, Confidential Trials Version
This packet belongs to the SCISP series on "Patterns." It consists of a pupils' manual and teachers' guide, and has corresponding background books and investigations booklets. The modules contained in this packet are: communities and populations, looking at organisms, cells and the development of organisms, electron and ions, and classifying building blocks. Each module is broken down into a number of small subunits.

FUSE

Schools Council Integrated Science Project 1971 114pp
SCISP Packet 2, Sample Scheme Sections 5-7, Confidential Trials Version
This packet belongs to the SCISP series on "Patterns." It consists of a pupils' manual and teachers' guide, and has corresponding background books and investigations booklets. The modules contained in this packet are: cells, organisms and water interactions; further interactions of particles, and doing work. Each module is broken down into a number of subunits.

FUSE

Schools Council Integrated Science Project 1971 55pp
SCISP Packet 2A/3, Sample Scheme, New Section 9, Confidential Trials Version
This packet belongs to the SCISP series on "Patterns." It consists of a pupils' manual and teachers' guide, and has corresponding background books and investigations booklets. The module contained in this packet is entitled "Competition and Cooperation." The module is broken down into a number of subunits.

FUSE

Schools Council Integrated Science Project 1971 122pp
SCISP Packet 4, Sample Scheme Sections 11-12, Confidential Trial Version
This packet belongs to the SCISP series on "Patterns." It consists of a pupils' manual and teachers' guide, and has corresponding background books and investigations booklets. The modules contained in this packet are: warming things, and fuels and food. Each module is broken down into a number of subunits.

FUSE

Schools Council Integrated Science Project 1971 90pp
SCISP Packet 4 Continued, Sample Schemes Section 4B, Confidential Trials Version
This packet belongs to the SCISP series on "Patterns." It consists of a pupils' manual and teachers' guide, and has corresponding background books and investigations booklets. The module contained in this packet is "Waves." Each module is broken down into a number of subunits.

FUSE

Schools Council Integrated Science Project 1971 115pp
SCISP Packet 5, Sample Scheme Sections 14A, 14B, and 15, Confidential Trials Version
This packet belongs to the SCISP series on "Patterns." It consists of a pupils' manual and technicians' manual and has corresponding background books and investigations booklets. The modules contained in this packet are: electrical interactions, energy and electricity, and distribution of building blocks. Each module is broken down into a number of small subunits.

FUSE

Scott, W. W.
Properties, Measurement and Models
St. Louis Country Day School
St. Louis, Missouri
This text is designed for the junior high school science student preparing for senior high school science. The emphasis throughout is on student processes. The two major topics of measurement and models are further divided into modular chapters. Each chapter beings with laboratory investigations to be followed by classroom summary and teacher guidance, and reading. The reading is placed last so that the student will investigate on his own and not become dependent on the text. The emphasis is on independent student learning, not lecture. A teacher guide is presented to assist the instructor.

FUSE

Scottish Secondary Science Working Party 17pp
Science Worksheets: Year One - Sections 1-15
London: Heinemann Educational Books Limited
These sheets comprise an integrated course in experimental science for secondary schools. The sheets are grouped in sections and each section is a unit. They should be used with Curriculum Paper No. 7 - Science for General Education, which gives a course outline, reading material, and lab work.

FUSE

Showalter, Victor 1967
"Laboratory Guides," "Activity Guides," and "Tests and Quizzes," in Unified Science Education at The Ohio State University School
The three sections in this collection of papers on unified science education present a sample of an 11th grade unit. Student activities, materials, laboratory exercises, and tests are presented for the unit. These sections give a good view of the set-up of a unified science program.

FUSE

Showalter, Victor 1967 97pp
Unified Science Education at The Ohio State University School: A Collection of Related Papers and Instructional Materials
This is a collection of papers compiled in response to requests for materials on unified science education. The collection contains articles on the rationale of unified science; sections on laboratory guides, homework activities, tests and quizzes, individual instruction, and a bibliography of reading resources for unified science.

FUSE

Showalter, Victor M. and Others 1972 79pp
Perceiving My World: Module 9B
Cleveland: Educational Research Council
This module was designed for unified science at Villa Angela School and is intended for ninth grade science. It is structured in seven parts: Does It or Doesn't It?, Dermo-Optical Perception; Tempus Fugit; Perceptive Discrimination; Assorted Ideas; Perceiving People. The educational objectives of the module are twofold: perceiving and hypothesizing. The activities are designed to be completed both independently and in the classroom. The module contains a list of learning objectives, detailed activities and demonstrations, and checkpoints for each activity.

ERC, FUSE

Showalter, Victor M. and Paul Holobinko 1971 56pp
Asking Questions or Starting Inquiry: Module 9A
Cleveland: Educational Research Council

This module was designed for unified science at Villa Angela School and intended for ninth grade science. It is structured in six parts: What? Is? Does? How?; The Majic Bottle; Rodents in Mazes; What You Always Wanted To Ask About Trees; On the Beach; A Fishy Situation. The purpose of the activities in the module is to make the student a better questioner and to broaden his general understanding. The activities are designed to be completed both independently and in the classroom. The module contains a list of learning objectives, detailed activities, and checkpoints for each activity.

ERC, FUSE

The Science Committee, Englewood Public Schools 1965 230pp
Science - Grade 9: Student Manual (Working Document)

This is a modular instructional unit for 9th grade unified science. It is divided into seven modules: introduction, observation, measurement, organization of the universe, matter, earth's crust, and life. Each section includes reading, diagrams, experiments, and questions. The manual has a corresponding teacher's guide.

FUSE

T.H.I.S., Moline Senior High School
Unit: "Computation"

This is one unit in the collection of student modules from the Moline Senior High School Unified Science Program. This unit deals with computation, and there are a number of modules available for inspection.

FUSE

T.H.I.S., Moline Senior High School
Unit: "Evolution"

This is one unit in the collection of student modules from the Moline Senior High School Unified Science Program. This unit deals with various types of evolution, and there is an exemplary module available for inspection.

FUSE

T.H.I.S., Moline Senior High School
Unit: "Graphs and Scales"
This is one unit in the collection of student modules from the Moline Senior High School Unified Science Program. This unit deals with graphs and scales, and there are a number of modules available for inspection.

FUSE

T.H.I.S., Moline Senior High School
Unit: "Measurement"
This is one unit in the collection of student modules from the Moline Senior High School Unified Science Program. This unit deals with measurement, and there is an exemplary module available for inspection.

FUSE

T.H.I.S., Moline Senior High School
Unit: "The Microscope and Microscopic Things"
This is one unit in the collection of student modules from the Moline Senior High School Unified Science Program. This unit deals with the microscope and microscopic things, and there are a number of modules available for inspection.

FUSE

T.H.I.S., Moline Senior High School
Unit: "The Mississippi River"
This is one unit in the collection of student modules from the Moline Senior High School Unified Science Program. This unit deals with the Mississippi River, and there are a number of modules available for inspection.

FUSE

T.H.I.S., Moline Senior High School
Unit: "Observation and Perception"
This is one unit in the collection of student modules from the Moline Senior High School Unified Science Program. This unit deals with observation and perception, and there are a number of modules available for inspection.

FUSE

T.H.I.S., Moline Senior High School
Unit: "Vectors"
This is one unit in the collection of student modules from the Moline Senior High School Unified Science Program. This unit deals with vectors, and there are a number of modules available for inspection.

FUSE

Thornton, John W. ED052063 SE012067 1971 97-130pp
"Cellular Respiration: An Example of a Module Using Programmed Format" in The Use of Modules in College Biology Teaching by Craeger and Murray
This is one of five sample modules contained in a text of a larger work. The purpose of this module is to gain a critical understanding of cellular respiration. A list of 13 instructional objectives the student should be able to perform following completion of the module is given, along with a pre-test and post-test, supplementary materials, and references for further study. The module is to be performed independently from classroom work and is presented in a programmed format. The material is intended to supplement the reading and study in this area, not as a substitute for it.

CUEBS Free

Van Deventer, William and Lucille Duyser 1971 44pp
Idea-Centered Laboratory Science - Unit A
This is the first of a seven unit series by I-CLS. In each unit an idea is presented and then followed up by a series of investigations. Each unit consists of a student packet and teacher notes. Unit A deals with "How A Student Learns About His World" and is divided into five modules.

FUSE

Van Deventer, William and Lucille Duyser 1971 62pp
Idea-Centered Laboratory Science - Unit B
This is the second of a seven unit series by I-CLS. In each unit an idea is presented and then followed up by a series of investigations. Each unit consists of a student packet and teacher notes. Unit B deals with "How A Scientist Behaves Toward His World" and is divided into four modules.

FUSE

Van Deventer, William and Lucille Duyser 1971 50pp
Idea-Centered Laboratory Science - Unit C
This is the third of a seven unit series by I-CLS. In each unit an idea is presented and then followed up by a series of investigations. Each unit consists of a student packet and teacher notes. Unit C deals with "How A Scientist Expects His World To Behave" and is divided into three modules.

FUSE

Van Deventer, William and Lucille Duyser 1971 86pp
Idea-Centered Laboratory Science - Unit D
This is the fourth of a seven unit series by I-CLS. In each unit an idea is presented and then followed up by a series of investigations. Each unit consists of a student packet and teacher notes. Unit D deals with "A Scientist Recognizes the Existence of Variation and Change in His World" and is divided into six modules.

FUSE

Van Deventer, William and Lucille Duyser 1971 98pp
Idea-Centered Laboratory Science - Unit E
This is the fifth of a seven unit series by I-CLS. In each unit an idea is presented and then followed up by a series of investigations. Each unit consists of a student packet and teacher notes. Unit E deals with "A Scientist Thinks of His World in Terms of Relationships" and is divided into seven modules.

FUSE

Van Deventer, William and Lucille Duyser 1971 46pp
Idea-Centered Laboratory Science - Unit F
This is the sixth of a seven unit series by I-CLS. In each unit an idea is presented and then followed up by a series of investigations. Each unit consists of a student packet and teacher notes. Unit F deals with "A Scientist Finds That His World Is Limited" and is divided into three parts.

FUSE

Withers, John D. ED052063 SE012067 1971 147-149pp
"Identification of Formed Elements in Human Blood"
in The Use of Modules in College Biology Teaching by Craeger and Murray
This is one of five sample modules contained in the text of a larger work. The purpose of the module is to learn to distinguish various types of cells and formed elements found in the blood. The module consists of an audiotape script which is transcribed in the article, a list of materials (including microscopic and prepared slides), and a key of terms. It is designed so that the student can complete the module independently.

CUEBS Free

PART III: ANNOTATED BIBLIOGRAPHY

RELATED TO UNIFIED SCIENCE EDUCATION

Explanation of coded information on entries in this section

Einstein, Albert ED 999999 SE 543210 1987 28 pp.
The Ultimate Science Course Institute for Universal Study
Princeton, South Dakota

(abstract of document)

EDRS .65/3.29, FUSE

Einstein, Albert = Author
ED 999999 = Reference number used in reporting this article in Research in Education and the identification number used for microfiche or hard-copy retrieval from ERIC collections or agencies. If number is missing, document is not in system.
SE 543210 = Reference number used by ERIC Center for Science, Mathematics, and Environmental Education. Used only in locating documents in Columbus center. If number is missing, document is not in system.
1987 = Date of publication or original document
28 pp = Number of pages in publication
The Ultimate Science Course = Title
Institute for Universal Education = Publisher or source of document. If an article is in a journal, the journal title will appear here.
Princeton, South Dakota = Location of publisher
EDRS .65/3.29 = Cost of obtaining copy from: ERIC Document Reproduction Service
P.O. Drawer 0
Bethesda, Maryland 20014

.65 = cost of microfiche
3.29 = cost of hard-copy
Note: Payment must accompany orders under $10.00 and all orders must be in writing. Extra charge for first class or foreign postage

FUSE = Alternative source of document (there is usually a charge for copying which would exceed the EDRS price.)

Amend, John R. SE 006 465 1968 332 pp
The Evaluation of an Integrated Advanced Atomic and Nuclear Science Laboratory Program at the High School Level
U.S. Office of Education
Reports on the development and evaluation of directed lab blocks in advanced physical science. Gives student materials. Topics have relevance for several traditional science subjects. Among topics are: beta energy determination, absorption of nuclear radiation, colorimetry. Most activities require fairly expensive equipment. Real focus is on instrumentation.

SMEAC

Cassidy, Harold G. November, 1970 pp. 5-7
"Creating an Interdisciplinary Course" The Science Teacher, Supplement
Describes a course in combined physics-chemistry developed at Yale University and intended to "produce citizens who are literate in science." Criterion for inclusion of subject matter is that it is "... expected to be important 20 years from now." The course is directed to non-science majors and includes some aspects of philosophy of science. Other topics in the course are described briefly noting mainly where the author has "... departed from the conventional."

FUSE

Cossman, George ED 025 414 SE 005 113 1967 154 pp
The Effects of a Course in Science and Culture Designed for Secondary School Students
University Microfilms, Ann Arbor
Reports study designed to evaluate success of special course for developing scientific literacy in grades 11-12 at the University of Iowa laboratory school. Experimental group was self-selected (N=21). Several significant differences found favoring experimental group on Test on Understanding Science, Watson-Glaser Critical Thinking Appraisal, Iowa Science and Culture Achievement Test, Science Opinion Survey, and Study of Values. No significant difference on Stanford Achievement Test - Advanced Science.

SMEAC

Craeger, Joan and Darrel Murray — ED 052 063 — SE 012 067 — 1971 — 173 pp

The Use of Modules in College Biology Teaching

The components, advantages, and applications of modules (self-contained independent units of instruction focusing on a few well defined instructional objectives) in teaching college biology, including their use in investigative laboratories are illustrated by five modules on a variety of topics. The illustrations reproduce written materials used in the modules and provide transcripts of the audio-tape segments used in some. Descriptions of modularized programs, some speculation on their future place in instruction, details of sources of information on module production, and two bibliographies, (on audio-tutorial methods and the use of behavioral objectives and individualized instruction) are included in this report. In some cases, data from preliminary evaluations of the technique are included in the descriptive reports.

CUEBS Free

Elton, L. R. B. — SE 007 071 — 1966 — pp 89-96

New Courses at the University of Surrey

The author describes the development of some undergraduate science and technology courses at the new University of Surrey, London, England. During the first two terms students of the five departments of physical chemistry and technology take a single course (PEMS) taught jointly by the departments. At the end of this he can then switch to one of several other departments. Courses in stages II and III are often offered at two levels and students can chose a mixture commensurate with their ability. Postgraduate courses, examination and credit system, and industrial experience are also described.

FUSE

Evergreen State College — 1972

Coordinated Studies Program

Includes bulletin and supplementary information about programs at this college. Especially relevant is the coordinated studies program which offers courses that transcend the discipline lines of a number of fields. Each course is different and lasts for only one year. Fields included are physical and life sciences, social science, humanities, history, political science, etc. The "moral curriculum" is stressed as well as the factual material from the fields.

FUSE

Francis, Gladys and Casper Hill — SE 000 451 — January, 1966 — pp 34-36
"A Unified Program in Science for Grades Nine through Twelve" — The Science Teacher

Describes the historical development and the present status of the unified science program at Dwight Morrow High School in Englewood, New Jersey. Cites perceived strengths, weaknesses, and problems of the program.

FUSE

Fuller, E. C. — SE 007 254 — March, 1964 — pp 136-138
"Combining First Year Chemistry and Physics for Science Majors" — Journal of Chemical Education

Among advantages claimed for combined courses are 1) a saving in time, 2) an integrated idea for future secondary school teachers, 3) a widened outlook on science and how it develops, 4) the subject matters complement each other, 5) applying a given concept to both fields deepens the students' understanding, and 6) the faculty also plans and works together. Some problems encountered are also outlined. The article gives an overall description of some parts of the course together with some specific ideas.

FUSE — FULLER

Fuller, Edward — September, 1967 — pp 542-544
"Recent Developments in the Teaching of Multidisciplinary Courses in Science" — Journal of Chemical Education

Reports the results of a survey of colleges and universities regarding multidisciplinary science courses currently being offered. Data from one-thousand colleges are reported on courses for science majors as well as for non-majors. About half the courses reported are labeled "physical science" and combine chemistry, physics, geology, etc. The others are various combinations of two standard courses. Smaller private institutions seemed more likely to offer multidisciplinary courses than did large state institutions.

FUSE

George, Kenneth and Susan Wrench — May, 1966 — pp 429-436
"Are You Prepared to Teach a Course in Unified Science?"
School Science and Mathematics

Presents a brief rationale for unified science courses in high schools and cites a few examples. Describes the results of a survey of unified science teachers to determine what, if any, unique characteristics they have. None are reported. Some differences reported for backgrounds of teachers in integrated chemistry-physics and those in courses unifying many sciences. The latter had taught fewer years and had fewer hours of college level physics and chemistry. Some recommendations on what courses and depth of preparation are recommended by unified science teachers for prospective unified science teachers.

FUSE

Gratz, Pauline — April, 1966 — pp 285-292
"An Interdisciplinary Approach to Science Teaching for General Education on the College Level"
Science Education

Describes the rationale for, and objectives of, the course developed at Teachers College, Columbia University, for undergraduates who were not majoring in science. It was offered as an addition to regular general education courses in science and extended over two semesters and carried eight credits. "The approach to the course is physiological since from this point of view the interdependence of the field of biology, chemistry, physics, and mathematics can be utilized and demonstrated."

FUSE

Gratz, Pauline — SE 000 125 — October, 1966 — pp 627-631
"Integrated Science - An Interdisciplinary Approach for Junior College Teaching"
The American Biology Teacher

Presents rationale for an interdisciplinary course with a brief description of an example conceived and taught by the author and based on physiology. Criticizes the usual non-science major course in science as being "not ambitious enough" in terms of academic rigor and, by implication, in scientific respectability.

FUSE

Gratz, Pauline 1966 103 pp
Integrated Science - An Interdisciplinary Approach Davis Company
This is a course outline prepared for science teachers who work with non-science majors in college. The introduction includes a discussion of general education and rationale and criteria of an inter-disciplinary course. The unifying concept for the course is "Man is an organism, interdependent with other organisms, adapted for change in a constantly changing biological, physical, chemical and psycho-social environment." Ten units are outlined, each with its own generalizations and suggestions for teaching. References and lists of experiments are also given.

Haskell, E. F. November, 1970 pp 8-15
"Assembly of the Sciences Into a Single Discipline" The Science Teacher - Supplement
An overview of science is given. An organized hierarchy is described that shows the relationships between atomic particles, atoms, molecules, plant ecosystems, animal ecosystems, and human cultures. Each of these levels has its own parts that are classified and which help in understanding of other levels. This is an extremely useful article for stimulating thought and discussion about underlying principles of science and the relation of science to philosophy.
See also Haskel - "Assembly of the Sciences," Vol. I (xeroxed), 1968, 617 pp. and Full Circle, The Moral Force of Unified Science, ed. Haskell; Gordon, and Breach, 1972.

FUSE

Hoehner, R. M. 1968 1 p
Society and Technology - A course Outline
Cleveland State University
Describes a sequence of 11-topics that constitute a one-quarter course.

FUSE

Hudes, Isidore and George Moriber SE 004 194 February, 1968 pp 39-42
"Integrated Science Education for Nonscience Students in a Large University" The Science Teacher
Describes three one-year courses developed at Brooklyn College, City University of New York. First year is physical science, second year a choice of biology or geology. All planned to achieve three basic aims: provide knowledge and appreciation of principles and theories of natural science, illustrate the various methods of science, show interrelation and interdependence of the various branches of science. Aims, objectives, and content evolves through bi-weekly staff meetings.

FUSE

The Institute of Physics SE 007 077 July, 1966 pp 129-134
"The Integration of Physics
and Chemistry Teaching" Physics Education
Reports the proceedings of a conference held at the University of Sheffield, United Kingdom, under the Institute of Physics and the Physical Society. Talks presented included "Education and the Unity of Physical Science," "The Nuffield Physical Science Course," and "Unconventional University Courses." Discussion was confined to the A level (terminal examination at the secondary school level) and undergraduate courses. It was stressed that, at the research level, the distinction between chemistry and physics is in many cases impossible to make, and in any event, irrelevant.

FUSE

"Interdisciplinary Science Education November, 1970 29 pp
Report of a Conference" The Science Teacher - Supplement
This is a report of a conference sponsored by the American University, with support from the National Science Foundation, held during January, 1969. Three papers were presented, "Interdisciplinary Science Education: A Position Paper" by Szent-Gyorgyi, "Assembly of the Sciences into a Single Discipline" by Haskell, and "Creating an Interdisciplinary Course" by Cassidy. Copies of these papers, together with reports of discussion sessions, are included. The desirability of interdisciplinary programs on the secondary and college levels was affirmed and suggestions for action were made.

SZENT-GYORGYI, CASSIDY,
FUSE, National Science Teachers Association HASKELL

Keohane, Kevin SE 005 615 October, 1968 pp 39-43
"Toward an Integrated Teaching
of the Sciences" The Science Teacher
Paper, presented at 1967 NSTA convention, which describes Nuffield Combined Science Project while still in its formative stages. Project is aimed at 13-16 year olds who will then leave school (70%). Major themes in the course identified as: 1-Interdependence of Living Things, 2-Continuity of Life, 3-Biology of Man, 4-Harnessing Energy, 5-Extension of Sense Perception, 6-Movement, 7-Using Materials, 8-The Earth and Its Place in the Universe. A diagram given to show relationships of topics covered. Developed to meet "an increasing demand for a broader, less specialized curriculum."

SMEAC, FUSE

Klopfer, Leopold and Donald McCann — SE 501 170 March, 1969 pp 155-164
"Evaluation in Unified Science: Measuring the Effectiveness of the Natural Science Course at the University of Chicago High School" — Science Education

Presents the procedures, results and conclusions of a study designed to evaluate the effectiveness of a unified natural science course compared to the Time, Space, and Matter course for ninth grade students at the University of Chicago Laboratory School. Student responses to individual test items were analyzed. Areas of success and failure within courses are identified (See McCann, 1968).

FUSE

Lerner, Morris — SE 000 382 February, 1964 pp 37-38
"Integrated Science - Physics and Chemistry" — The Science Teacher

Describes the rationale for and some results of the integrated physics-chemistry course at Barringer High School, Newark, New Jersey. In general, favorability was shown for those students in the combined course compared to those who were in separate chemistry and physics courses in the same school at the same time.

FUSE LOWRY

Lowry, George G. — SE 006 994 June, 1969
"An Integrated Physics-Chemistry Curriculum for Science Majors" — Journal of Chemical Education

Describes a four year course for majors in chemistry, chemistry and physics or physics at Claremont Men's College, Claremont, California. In the first semester of freshman year physics and chemistry are combined and followed in the second semester by concurrent courses stressing applications to physics and chemistry. An outline description is given for all the courses. Limitations and advantages of the program are described.

FUSE

McCann, Donald 1968 21pp
Evaluation in Unified Science: Measuring the Effectiveness of the Natural Science Course at the University of Chicago High School

Paper presented at NARST, 2/11/68

Reports findings of a study comparing ninth graders in the Natural Science course to those in Time, Space and Matter course in same school. The instruments used were: Test on Understanding Science (TOUS) and Subject Matter Test (SMT) which was devised locally using "...bits and pieces of several other tests combined with a number of questions contributed by the teachers..." of both courses. Among findings: Natural Science students did significantly better on TOUS; TSM students did better on SMT. Findings are discussed.

FUSE

Mentzer, Dean S. EJ 018 656 EM 500 867 April, 1970 pp 29-31
"The Audiotutorial Laboratory" Audiovisual Instruction 15:4

Discusses the application of S. N. Postlethwait's audiotutorial approach to teaching integrated science to a nursing school program (LS) at the Washington Hospital School of Nursing, Pennsylvania.

Mohrig, Jerry R. and Tooney, Nancy M. SE 006 914 pp 33-35
"Biochemistry in the Undergraduate Curriculum - An Interdisciplinary Course" Journal of Chemical Education

A one-year course was designed where concepts of contemporary biochemistry and molecular biology were integrated for a group of junior-senior level students in a four-year undergraduate college (Hope College, Holland, Michigan). Topics included biochemical methods, cell topology, nucleic acids, biochemical catalysis, energy production and transduction, molecular genetics and protein biosynthesis. The second semester included optional laboratory work. A listing of lectures and laboratory experiments is given.

FUSE

Nesbitt, H.H.J. and John Hart November, 1964 pp 895-896
"Science 100," 1963-64 Science

Describes a college course for non-science majors to meet the problem of, "... imparting to arts students, in 26 weeks, a smidgen of what science is all about." Original papers used as text material.

FUSE

Nurnberger R., Ward, R. W. and Reynolds, G. W. EJ 019 706 SE 501 157 March, 1969 pp 137-140
"Unified Science: A Workable Approach" Science Education 53:2
Describes the objectives and content of a two-semester course in unified science for college students who are non-science majors. Student opinions regarding the course were assessed. A text, a set of self-instructional laboratories, and remedial units are being developed. Bibliography.

Peckham, Herbert D. SE 501 805 Spring, 1970 pp 17-24
"An Integrated Physics-Calculus Course"
Two-Year College Mathematics Journal
Describes problems considered in the setting up of a first course in calculus and physics for mathematics and science majors at Gavilan College, Gilroy, California. The course is part of a core program also including geometry, computing, and chemistry. The integrated physics-calculus course covers five quarters with most of the time being devoted to lectures and discussions led by the students. Grades are determined by conference between student and faculty; graded examinations having been eliminated.

Pfeiffer, Carl ED 054 965 SE 012 468 1969 50 pp
"The Development and Implementation of a Four-Year Unified, Concept-Centered Science Curriculum for Secondary Schools, Final Report"
Monona Grove High School (Wisconsin)
Describes the rationale and development of a USOE funded project in which unified science became the only science offered in a medium sized four-year high school. Includes outline of curriculum and results of evaluative studies along with recommendations.

EDRS .65/3.29, FUSE

Ramsey, Gregor A. and Robert W. Howe ED 026 287 SE 006 396 March, 1969 pp 62-70
"An Analysis of Research on Instructional Procedures in Secondary School Science, Part I - Outcomes of Instruction" The Science Teacher
Reviewed is research on instructional procedures used to teach science in secondary schools. This part, the first of a two part review, discusses studies emphasizing outcomes obtained from generalized instruction in a classroom or classroom-laboratory setting. Outcomes discussed include knowledge of science content and concepts, understanding the scientific enterprise, critical thinking, and attitude development. The review is summarized by ten conclusions arising from the implications of the research studies reviewed. An extensive bibliography of the field is included.

EDRS .65/3.29

Ramsey, Gregor A. and Robert W. Howe
ED 027 233 SE 006 480 April, 1969 pp 72-81
"An Analysis of Research on Instructional Procedures in Secondary School Science, Part II, Instructional Procedures" The Science Teacher

This is the second of a two-part review of instructional procedures in secondary school science. Analyzed are research studies in the field mainly over the period 1960-67. Studies were reviewed under the following headings: team teaching, programed instruction, audiovisual aids, laboratory procedures, extra classroom activities and field experiences, content integration, classroom interaction, and teaching duration. Thirteen conclusions and suggestions summarize some of the implications of the findings of the research reviewed. A bibliography listing 103 studies is included.

EDRS .65/3.29

Reif, F. May, 1969 pp 1032-1037
"Science Education for Nonscience Students"
Science

Describes the rationale for and methods of implementing the Contemporary Natural Science (CNS) course at the University of California, Berkeley. The course runs for one school year and "...is designed to deal with some of the fundamental ideas of physics, chemistry, and biology in a manner that minimizes the distinct boundaries between these fields." Staffed by three faculty members from each of the fields plus graduate teaching assistance. The main instructional activities are: large group (600), demonstration laboratory and small group discussion. Among organizing themes are: superposition, order (as opposed to randomness), invariance, and evolution.

FUSE

Remick, Edward SE 001 882 1965 128 pp
A Study of an Experimental Program of Integrated Industrial Arts-Science in the Junior High School University Microfilms, Ann Arbor

Reports the development of and objective results of an eighth grade integrated industrial arts-science course. Experimental group worked in physical science laboratory and in industrial arts facility while control group worked only in laboratory. Data from Sequential Test of Educational Progress, Form 3B, and teacher-made tests showed significantly favored experimental group.

SMEAC

Schwartz, Donald SE 003 545 October, 1961 pp 357-359
"Fundamental Science Course:
The Nature of Things" Science Education

This is a three quarter course of four quarter hours each that is offered to both science and non-science majors at Moorhead State College, Minnesota. It is planned "to develop the understanding of and give practice in scientific methodology and its open-minded, systematic and critical approach to problems; to provide perspective of the students' own place in an ever changing scientific world; and to help him see that chemistry, physics, biology, and geology are very closely interwoven." An outline of the units comprising the courses is given.

FUSE

Showalter, Victor ED 024 593 SE 005 192 1967 105pp
Effects of a Unified Science
Curriculum on High School Graduates Ohio State University
Research Foundation

Specific effects of a four-year unified science curriculum (grades 9-12) were grouped in 1) interest in science, 2) scientific literacy, 3) preparation for college. The 358 subjects had graduated from high school one to seven years prior to study. Efforts were made to control: intelligence, school achievement, school setting, sex, age, etc. Findings indicated general and consistent favorability for unified science over traditional curriculum. Level of significance exceeded arbitrary minimum in several cases. Includes syllabus, ASLI test for scientific literacy, bibliography of unified science.

EDRS .65/6.58, FUSE 1967b

Showalter, Victor March, 1969
"The Promise of Unified Science Education"
Science Education News

Describes the diversity, general characteristics, advantages, and evaluative results of unified science programs presently underway in the United States. Identifies teacher involvement, understanding, and motivation as key factors in making programs successful.

FUSE, American Association for Advancement of Science 1969a

Stanitski, Conrad SE 001 470 March, 1967 pp 385-388
"An Integrated Freshman Chemistry - Physics Course - A Preliminary Report" School Science and Mathematics
Describes program developed at Edinboro (Pa.) State College. Extends through two semesters and serves "...as the basis for subsequent courses taken by a physics or chemistry major." The integrated approach gains time and is "team-taught" by one staff member from each chemistry and physics, neither of which attends the other's lectures.

FUSE

Thomson, Barbara (ed.) 1970 47pp
Proceedings - Fifth Annual FUSE Conference ERIC Center for Science, Mathematics, and Environmental Education
Reports the salient points made at each of the eight major sessions of the Fifth Annual FUSE (Federation for Unified Science Education) Conference conducted at Portland, Oregon in September, 1970. Specific topics included: Course Evaluation, Integrated Science and the University, and Resources for Teaching Integrated Science.

SMEAC, FUSE

Walter, Robert I. SE 000 140 October, 1966 pp 561-562
"New Curricular Features in Some Liberal Arts Colleges" Journal of Chemical Education
Unusual introductory chemistry courses offered at two liberal arts colleges are described. At Ursinus, an integrated chemistry-physics-mathematics course is required of all science majors. At Lebanon Valley College, students enter either the conventional chemistry course or one emphasizing major chemical theories.

FUSE

Ward, Roger W. and Reynolds, G.W. and Nurnberger, R. SE 501 167 March, 1969 pp 137-140
"Unified Science: A Workable Approach" Science Education
Describes a college course intended "to enhance the overall understanding of the nature of science for students not majoring in science." The course extends through two semesters and develops five "unifying themes for science." Among these themes are: "Changes in structural organization are accompanied by energy changes" and "Systems evolve." Reports that 60% of the first student group felt that the course involved "fundamental ideas and concepts which related large blocks of knowledge in science."

FUSE

Yager, Robert and George Cossman — ED 018 400 — SE 004 547 — 1966 — 159pp

Guidelines for the Development of a Course for Secondary Schools Emphasizing the Interaction of Science and the Culture of Man. Final Report. University of Iowa

Reports a USOE-sponsored project. Gives results on students as well as detailed outline of course. (Same study reported as Cossman, George, ED 025 414.)

EDRS .65/6.58